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**Space
Weapons**

INSIDE PUGWASH NEWSLETTER

Special newsletter for Bulletin readers on the Pugwash conferences

Two Pugwash Workshops Scheduled For June

May vol. 1 no. 9

US and USSR scientists keep lines of communication open at Pugwash

Despite the current international climate, Pugwash is continuing its schedule of workshop meetings. In fact, the two most crucial issues now confronting us, on which communications seem to have completely broken down elsewhere, will be discussed at four days of workshop meetings in June.

Tenth workshop to talk about resumption of INF and START

The collapse of the INF and START talks have heightened tensions and have made the current international situation more precarious than ever. Fortunately, Pugwash members have been able to keep their lines of communication open. The trust and respect between the renowned scientists who make up Pugwash — scientists from communist, non-communist, and non-aligned nations — has enabled them not only to continue meeting, but to deal directly with the current problem.

As has happened so often in the past thirty years, in times of crisis, Pugwash is now one of the only, if not the only, forum where the current impasse might be resolved. Thus the meeting scheduled for June 1 and 2 in Geneva takes on special urgency.

Both participants of previous workshops and new invitees will attend the Workshop on Nuclear Forces scheduled for June 1 and 2 in Geneva. Participants will attempt to work out steps that will lead to a resumption of official negotiations, as well as agreements on the basis for combining the INF and START talks. Obviously this meeting is of great importance. It may be that the results will simply be communicated by participants back to their own governments, as part of an unofficial process. Pugwash has been very effective using this method in the past. We will report the results of this meeting in this space, as completely as we can.

More results from December Workshop

As previously reported in this space, the December Workshop recommended a mutual freeze on all nuclear deployments in Europe to provide a "cooling off" period. Now Pugwash members are ready to discuss concrete details of how such a freeze might work.

The preliminary planning has been completed, so that on June 3 and 4 in Geneva, a workshop will be held on Proposals for a Freeze on Nuclear Weapons. The following topics will be discussed: implications of a freeze with respect to time components, possible unilateral declarations and reciprocal steps leading toward a signed agreement, verification of stoppage of production, testing and deployment of nuclear weapons and other factors.

Working Meeting

It is clear that this will be a working meeting, with issues of substance being debated. The results will be important, perhaps critical. There is no doubt that a sound scientific basis upon which such agreements can rest will increase the chance of their being accepted by the nations involved.

You can see from the descriptions above, that these two June workshops are vitally important. That is why Pugwash is asking for your help. Travel costs for scientists from each of the nations involved, and for those who have particular expertise in the areas under discussion, are becoming increasingly heavy. By becoming a **Friend of Pugwash**, you can make possible the participation of the people whose presence is so important, and thus you can make a real and immediate contribution to these critical June workshops.

Please don't delay. Fill out the form below, and become part of Pugwash's work for peace. Your contribution will help make these vital June Workshops happen.



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Bulletin of the Atomic Scientists



The Bulletin Clock, symbol of the threat of doomsday hovering over humanity, stands at three minutes to midnight.

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This One



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On the cover: Artists' conceptions of U.S. and Soviet anti-satellite weapons, courtesy of the Department of Defense. Design by Lisa Grayson. (See "Space Weapons" by Richard Garwin and John Pike; Yevgeny P. Velikhov, pages 15-16S.)

Lost in space

by Alan P. Lightman

MY FIRST face-to-face meeting with scientists working on space weapons happened on a visit to the Hudson Institute in January 1979. Jimmy Carter was still in the White House and Ronald Reagan's "Star Wars" speech was more than four years down the road.

After strolling across the serene and spacious grounds of the Institute, which is nestled in a bucolic setting overlooking the Hudson River, I was led into the cozy office of a physicist who could scarcely wait to tell me about new developments in "particle beam" weapons, to be stationed aboard orbiting satellites in space. After a vivid description of intense beams piercing earthward from above, he excitedly showed me some artists' sketches of what the things might look like and, as I recall, even had a papier-mâché model, which he let me hold briefly. For a moment I got caught up in the air of derring-do, and wondered what Santa might bring me next year.

That childlike and visceral attraction to the new generation of nuclear weapons in space is real, dangerous and seldom discussed. The technical issues, on the other hand, have received a lot of attention. To summarize briefly, there is a growing consensus among most weapons experts that a space-based ballistic missile defense system is probably not workable for another 20 years and, even if eventually deployed, would be costly and destabilizing. In the words of Hans Bethe, the needed technologies are "far beyond the state of the art."

While countermeasures, like decoys and hardened boosters, appear abundant and relatively cheap, the price of a working system would be staggering. To aim a defensive laser beam at the soft parts of a missile thousands of miles away requires the angular resolution of the upcoming (and peaceable) space telescope, which runs to a billion dollars. One hundred ballistic missile defense satellites would be needed to give adequate coverage of the Soviet Union, adding up to at least several hundred billion dollars, not to mention the incalculable cost of a new arms race likely to follow.

Once operational, an effective space-based system, in union with offensive weapons, could give the deployer a first-strike capability, inviting preemptive attack by the other side. The high vulnerability of such a system further encour-

ages attack. And any orbiting weapon in space, offensive or defensive, threatens the surveillance and communications satellites used since the early 1960s and considered vital for national security. All of the above arguments apply whether the ballistic missile defense system is nuclear or not. A nuclear space-based ballistic missile defense system would, in addition, violate the 1967 Outer Space Treaty and the 1972 Anti-Ballistic Missile Treaty. When it comes to nuclear weapons, all agreements between us and the Soviets seem especially precious. These are a few of the technical worries. Apparently they have had some effect, and President Reagan, when talking about space in public these days, has limited himself to plans for space stations.

TECHNICAL issues aside, however, the glamor of Star Wars still shimmers and beckons. Millions of us, children and grownups alike, saw the movie and were mesmerized by images of death-dealing laser rays, sleek aircraft shooting it out in space, and handsome young men battling the forces of evil. These heady visions seep into the unconscious and resonate with the leftover daydreams of little boys. The space age is here at last, and no one—teacher or businessman or senator—wants to be left behind. "Seize the high ground before the Russians do" is a familiar bugle call from the Air Force, which established its Space Command in 1982.

Scientists are needed to work on these things and scientists, as C.P. Snow has reminded us, are not much different from other people. The team of fighter jocks immortalized in Tom Wolfe's *The Right Stuff* seem to have been curiously reincarnated in the dozen or so young physicists "pushing back the edge" in space weapons design in "O Group" at Lawrence Livermore National Laboratory.

Profiled several months ago in William Broad's article in *The New York Times*, these intellectual test pilots are mostly in their twenties, and are all male. They inhabit a world of empty Coke bottles and all-night bouts with top-secret research, and share an admiring respect for each other's brain power. A "right stuff" ethic flourishes in all areas of science. But in O-group this is combined with the glamor of space, the thrill of inventing new kinds of nuclear weapons, and youthful idealism.

Says O-group physicist Lawrence West, age 28, "We can try to negotiate treaties and things like that. But one thing I can do personally, without having to wait for arms control, is to develop the technology to eliminate them myself, to eliminate offensive nuclear weapons." What more dangerous creature than the inexperienced macho, armed here with pencil and paper? Chuck Yeager, Gordon Cooper and

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John Glenn all prided themselves on hanging their hides over the edge. How much hide-hanging has been done and can be done by the fellows of O-Group? None has seen a nuclear explosion. Since the 1963 Test Ban Treaty, there haven't been any, above ground. Even the few old men of my generation, in their mid-thirties, were born after World War II, after Hiroshima and Nagasaki, and learned about the Manhattan Project from books.

A related motive to watch closely is the love of technology for its own sake: from greeting cards that sing Happy Birthday when opened to F-15s that turn corners at greater acceleration than pilots can endure. In theoretical physicists, this translates to pursuit of intellectually interesting problems—wherever they lead. As West says proudly, “The number of new weapon designs is limited only by one’s creativity.” Compare Robert Oppenheimer’s comment 30 years ago: “When you see something that is technically sweet you go ahead and do it and you argue about what to do about it only after you have had your technical sweetness.”

It is difficult to find fault with the argument that basic research in space weapons should continue. We had better at least find out what the laws of physics allow. Most likely the Soviets will. And it is conceivable, as the Harvard Nuclear Study Group and Freeman Dyson have suggested, that our security in the long term might best be served by replacing our current nuclear strategy of mutually assured destruction with one of defense, possibly from space.

Research should continue—but soberly, with both feet on the ground. Earthbound ICBMs, waiting silent and pre-programmed in their Midwest silos, are dreamlike enough. Weapons orbiting in space dissolve almost completely into a mist of make-believe.

Sirens of the unconscious call us to Star Wars: glamor, novelty, childhood fantasies, macho power, technical narcissism. It would seem wise to bring these psychological motives into daylight, to attach as much importance to them as to the technical issues. The weapons themselves are unthinking, but their creation and deployment spring from the human mind. □

Irresistible, irrational, indomitable military technology

by Etienne Bauer

IN FAIRY TALES there are kings and queens, and when a new princess or prince is born, all the good fairies come to give their blessings or gifts of beauty, luck and so forth. Then an uninvited fairy arrives—old and ugly. Her power is so great that when she puts a curse on the newborn child nobody can do anything about it: the child will sleep for 100 years; or it will be ugly; or when it speaks, frogs and serpents will come out of its mouth.

So it is with military technology. It is not that it is unknown; it simply is not invited to the diplomatic game, where people who certainly do not agree with each other do roughly what they can or believe they must do for the contradictory objects of peace and of safeguarding their countries.

Military technology is the wicked fairy mainly because it goes its own way—far from the kings and queens of our

time—in laboratories and industries that are not known, very often not even by the governments involved. Those who work there are people of good will who do what they can in the very general mission that is given them—to use technology for their country’s safety.

But they do not work at the same pace as governments. Their projects take from 10 to 20 years to be implemented, while most governments last for one year, two years or five at most. And the technologists, who move more slowly, are the real bosses.

Governments, of course, could stop this if they decided to give no more money to military research. But because of their fear of other countries they cannot do so. They cannot say, “We stop,” if everyone else goes on. And for everyone to stop would require an international organization, some sort of police. An international satellite for peace was one idea that was supposed to make this more possible. But governments do not want to take the risks of obeying international laws and of halting weapons research.

Military technology is irresistible. When a device is invented, who would be strong enough or feel safe enough to say: “We will not produce this device”? It is asking too much. This of course could apply to either side, and the example of the SS-20 is not an accusation.

Soviet scientists probably began to think about the SS-20



Etienne Bauer is chairman of the International Center for Teaching Energy Policy in Paris and a member of the Pugwash Council.

some 10 or 15 years ago. They knew that a modern technology was available and thought, probably rightly, that the Americans had the same technology and were beginning to develop it. Thus in Soviet military laboratories the new weapon began to take shape. Then came various prototypes and finally industrial production. But the SS-20 came into a world situation that was unforeseeable at the time when the project began, profoundly shaking the United States and Europe. The Soviet missile became a major incentive to the Pershing and cruise missile projects.

On the other hand, the United States or the United Kingdom or France almost certainly have in their technical establishments weapons projects that will come out in 10 or 15 years and be completely destabilizing. Politicians have no power to stop a project that has cost so many years, so much money and so much work. When it is ready, it comes out—and the world is shaken. Each side accuses the other of imperialism, bad intentions and so on.

It appears that technology goes entirely its own way, even in the most planned economies. When something *can* be done, it is impossible to resist trying it. And when it has been tried, it seems impossible not to implement it. It all ends with a race between technologists, and not between politicians. It is natural, automatic—and extremely dangerous.

ALL this mechanism, working on its own, is in fact of no great use. The two superpowers, and the smaller nations also, could very easily decide to diminish the numbers of their nuclear warheads by a very great percentage, and their safety would not be diminished at all. But there is also the weight of public opinion and of the strategists who play *kriegspiel* and will, with the best intentions, prove that a new weapon is needed because the other party will have it.

The notion of equilibrium is of course insane; it is a notion of accountants. How can you compare two regions with such different geopolitical situations? You cannot abolish the Atlantic Ocean or the fact that Western Europe, having a greater density of towns and a different social system, is more vulnerable in many ways. The idea of equilibrium, with the numbers of warheads that now exist, makes no sense. The only thing to be said is that it seems impossible to achieve even a slowdown in the progress of weaponry.

How can we possibly stop this terrifying situation in which diplomats reach arms control agreements while, in the research establishments on both sides, "progress" is made and new weapons are dreamed of? Then, coming out of the blue, those new weapons destroy irresistibly all the work of the diplomats.

How is it possible to stop a technology that secretly goes its own way? No one knows about it except those involved; "top secret" is written everywhere. Then when a new weapon appears, all governments, including that of the country where the weapon was made, are completely flabbergasted. We

know, for example, that many people are working on devices to detect submarines and to destroy satellites, but even those antiweapon systems are destabilizing. How can governments be freed of the tyranny of a phenomenon able to see only its own aim and to make the world still more dangerous—and all with a very clean conscience? □

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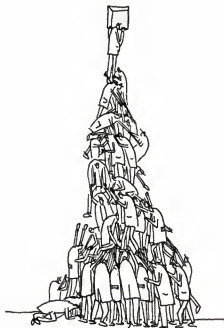
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The 'spending gap'



Steven Kiecker, United States

by Raymond L. Garthoff

DURING the late 1970s government leaders began to emphasize a perceived "military spending gap," reflecting a "relentless Soviet military buildup." In his annual report to the Congress in January 1977, Secretary of Defense Donald Rumsfeld referred to a Soviet annual rate of increase in military spending of 4 to 5 percent during the early 1970s, but with higher growth in the latter years, so that "there appears to be an acceleration in the growth of Soviet defense outlays."

Rumsfeld's successor, Harold Brown, stated in his first annual report that "the present disparity in defense spending between the United States and the Soviet Union—and still more the trend—is dis-

quieting as an index of both Soviet capabilities and Soviet intentions." A year later he reiterated that the Soviet annual rate of increase was 4 to 5 percent, and added: "Although Soviet intentions cannot be surely assessed, there can be no doubt about the steady increase in the Soviet defense effort each year for more than 15 years." He stressed Soviet military spending for investment and "hardware" procurement.

Finally, in his valedictory report in January 1981, Brown again noted that the upward trend in annual military spending, measurement of which, he said, was "much less susceptible to the methodological problems of comparing absolute levels of U.S. and Soviet spending in a given year." The increase was, in his words, "clear and dramatic. Soviet defense spending has increased steadily and significantly by an average of four to five percent a year . . . this trend has continued, even as the rate of growth of Soviet GNP has declined."

The Reagan Administration has placed even greater stress on Soviet military spending for investment. Caspar Weinberger's reports in 1982 and 1983 replaced the customary dynamic comparisons and net assessments of the strategic forces of the two sides with graphs depicting overall military *spending outlays*. "Supply-side" defense analysis had arrived, further emphasizing expenditure "inputs" rather than order of battle "outputs." American defense programs similarly emphasized expenditures more than results, perhaps to assuage feelings of "doing something," of "standing tall" rather than pondering the uses of military power. Also, some Administration figures have openly

voiced confidence in pushing the Soviets into an arms race which their economy and political system are believed to be less able to sustain.

In 1977 there was a turning point in public opinion poll findings. A larger number of people believed that the United States was spending too little on defense than that it was spending too much. This reversed the view that had prevailed since disenchantment over Vietnam. By 1980, after Afghanistan, the last Carter defense budget rose by more than 10 percent in real terms over the preceding year.

Thus, ever since 1977 considerable weight has been placed on the trend of Soviet military spending, especially for weapons procurement and other investment, as an indicator of a growing Soviet threat. American estimates of Soviet military spending were used as a basis for judging Soviet aims and policy, and as a justification for increased U.S. (and NATO) defense efforts. In fact, it became a major "selling point" for a U.S. buildup.

In the SALT II debate in 1979 this was given particular prominence, as Henry Kissinger and a number of other earlier advocates of SALT conditioned their support for the SALT II treaty on a U.S. commitment to an increased rate of military expenditure to dealing with the "spending gap" and its consequences. Many charged that the "relentless" increase in Soviet military spending showed that the Soviet Union was taking advantage of detente.

WE NOW KNOW that these confident estimates of a steady acceleration of Soviet spending were wrong. Soviet military outlays are still estimated to have grown at a rate of some 4 to 5 percent annually during the first half of the 1970s. But revised CIA (and NATO) estimates since mid-1983, based on new and better information, show only a 2 percent annual increase for the period



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From Washington



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since 1976.* Moreover, in the words of the CIA report:

New information indicates that the Soviets did not field weapons as rapidly after 1976 as before. Practically all major categories of Soviet weapons were affected—missiles, aircraft, and ships. . . . The rate of growth of overall defense costs is lower because procurement of military hardware—the largest category of defense spending—was almost flat in 1976–1981 . . . [and that trend] appears to have continued also in 1982 and 1983.

The reasons for this reduced rate of defense expenditures are not entirely known, but the "extended nature" of "the slowdown in the growth of military procurement . . . goes far beyond normal dips in procurement cycles." Growth of Soviet gross national product had slowed, so that the share devoted to the military has remained about the same, while the earlier estimated growth in that share has not occurred.

So the "relentless Soviet buildup" to an important extent reflected a U.S. error in estimating Soviet outlays, rather than being a "disquieting index of Soviet intentions." There were, to be sure, significant real improvements in Soviet—and Western—military capabilities, but the "spending gap" proved no more solid than the bomber, missile, ABM and civil defense gaps of the preceding decades. But it had its impact.

Little notice has been given to this greatly revised intelligence estimate. And no attention at all has been given to the implications of the whole affair for Soviet perceptions.

Having significantly cut back in their military spending and leveled off in weapons expenditures since 1976, Mos-

cow could only view U.S. reiterations, year after year, of a gross overstatement of Soviet military outlays as deliberate and ominous. Soviet political and military leaders did not see continued U.S. assertions—under three Administrations—of a relentless buildup in Soviet military spending and procurement as an error in intelligence assessment (which it was), but as a policy to justify a U.S. buildup while putting the blame on them. This naturally fed broader suspicions of U.S. motives, and those suspicions seemed to them to be confirmed by the course of U.S. policy and action over these years.

The U.S. campaign on Soviet military spending had, for example, been used in 1978 to get the NATO countries to commit themselves to at least a 3 percent annual increase, and in 1979 contributed indirectly to obtaining NATO agreement to deploy new U.S. missiles in Europe. The campaign had also been accompanied by the drawn-out SALT II negotiations, and then used to press for an increase in U.S. military spending as a condition for SALT II ratification. Finally, it was justified on other grounds, as SALT II was, in any case, not ratified.

The reluctant, belated and very low-key acknowledgment of the new estimate, in the fall of 1983, was not used to modify the U.S. buildup. On the contrary, new U.S. defense budget requests in January 1984 were larger than ever, calling for a 13 percent real increase. The only change is that comparisons are no longer being made with a "relentless" rate of growth of Soviet military spending—at 2 percent real increase.

Harold Brown has been widely quoted, especially by headline advocates of defense, for his comment that "when we build [our military capabilities], the Russians build; when we stop, the Russians build." That aphorism implies that there was a time when the United States had stopped; in fact, there has not been. But the experience with the "spending gap" suggests, with only a little exaggeration, another aphorism: "When the Russians build up, we say they build up; when they don't build up, we say they build up." □

*The revised CIA estimates were first disclosed in testimony by the Deputy Director for Intelligence, Robert Gates, in open subcommittee testimony on Sept. 20, 1983. The statements cited are from the transcript CIA briefing paper, "USSR: Economic Trends and Policy Developments." (Sept. 14, 1983), mimeo, pp. 8–11, to be printed in the forthcoming "Hearings on the Allocation of Resources in the Soviet Union and China—1983," before the Subcommittee on International Trade, Finance, and Security Economics of the Joint Economic Committee, United States Congress, Sept. 20, 1983.

Going with Small ICBMs

by William M. Arkin

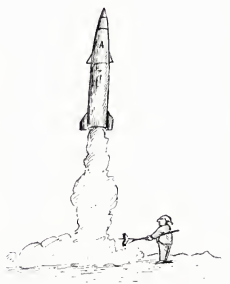
THE SMALL ICBM (SICBM) has quickly and surprisingly caught on as a real weapon. Its supporters have conjured up numerous justifications for it, which on close examination are identical to disproven MX logic.

Hardly anyone opposes the missile, viewing it as secondary to the more dangerous MX. But every company that ever touched the MX program is jumping on the Small ICBM bandwagon, scurrying for a piece of the \$70 billion pie to develop the missile, its hardened mobile launcher and future "basing." The Department of Defense modestly describes the program as "the highest national priority."

Who supports this new weapon? Leading off are the government bureaucrats and contractors who will work on anything. Adherents in Congress include MX opponents who want both to forestall additional MX missiles and disprove accusations that they are "soft" on defense.

"Build down" supporters and moderate arms controllers are intrigued with the possibility that Small ICBMs will lead to reductions in "destabilizing" MIRVs (multiple independently targetable reentry vehicle). They generally like the idea of increasing the number of missile targets, though they are wary about mobility and its possible verification problems. Former MX supporters who still cling to the need for ensured ICBM survivability also like the small missile; they apparently do not see it as a threat to the MX.

Then there are those who believe that arms control cannot be depended on to



Valery, West Germany

preserve either deterrence or stability. They believe that negotiations are fine, but cannot substitute for deploying forces at an equal pace with the Soviet Union. According to their view, single-warhead missiles are more flexible for targeting and war plans. As far back as 1979, General Richard Ellis, then head of Strategic Air Command, told the Senate Armed Services Committee that "If there were no constraints to the ICBM force, the ideal system for all scenarios of limited nuclear war would be a highly accurate, selectable yield, single RV missile."

Eleven days after the Scowcroft Commission reported its findings in April 1983, a Small ICBM Program Office was established. General Dynamics and Boeing Aerospace had already received contracts in 1982, as part of the "Advanced ICBM Study." Since the Commission report, more than 15 development contracts have been awarded and

about 30 companies will be under contract for components by July.

The "baseline" small missile will be about 44 feet in length, four feet in diameter, and have a throw-weight of approximately 1,000 pounds. Weighing 30,000 pounds, it will have a range of 6,000 nautical miles. It will incorporate a lightweight version of the MX guidance system, an Mk-21 reentry vehicle, and have mobile basing "compatibility." Current estimates say the missile will attain an accuracy of 300 feet CEP (circular error probable) and the warhead will have a yield of about 500 kilotons.

Component work on maneuvering reentry vehicles, earth penetration warheads, and lightweight penetration aids is also being pursued. The current schedule for the Small ICBM is full-scale development beginning in early 1987, flight testing in 1988 and initial deployment in 1992. The plan is to deploy 1,000 missiles, between 350 and 500 on mobile launchers, 50 at each base and the rest in hardened silos or deep underground.

According to a January 1984 Defense Department report to Congress on ICBM modernization, "The key to developing the Small ICBM as soon as possible is to build on current Peacekeeper technology and contractor competition in the early phases of the program." MX contractors, recuperating from the many turn-arounds on their missile, are the core of the Small ICBM "team."

THE TEAM, of course, specializes in rejected "basing modes," where the Small ICBM promises to rival or even outdo the MX. All those old concepts of mobile MX (and Minuteman) basing—from trains, trucks, ships and airplanes—had "public interface problems," according to the contractors. They have found a better way. The old ideas were too "soft" against the effects



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of nuclear explosions. They required huge dispersal areas to promise a high probability of survival.

For a smaller missile, though, a rugged and hardened mobile launcher can be developed. The hardened launcher will be able to withstand "tens of pounds per square inch overpressure" and wind from 600 to 900 miles per hour. And what a launcher it will be.

According to the Defense Department, "the major concern is blowaway or turnover caused by the blast wave passage and accompanying high-velocity winds resulting from a nuclear blast." But more important than actual hardness "is the seal the vehicle makes with the road. . . . A near-perfect seal is required to prevent air flow under the vehicle that could cause it to flip over." Some high technology "sealing and anchoring mechanisms" will be investigated, including quick-hardening foams. The Defense Nuclear Agency will test the launchers after it has constructed an airblast simulator "to generate megaton-level airblast environments . . . [in] ideal, dusty, and thermal conditions, with peak pressures of 30 to 50 psi [pounds per square inch]."

"Prelaunch survivability" will permit deployment on large military bases, with the launchers "moving at random." The January 1984 ICBM modernization report admits that "it is unclear" whether there exists "a vehicle hard enough to permit basing only on Department of Defense lands." Small areas might be suitable for "day-to-day" operations, but "it may be necessary to disperse the force . . . in areas surrounding the base, in crisis situations."

Just in case mobile basing doesn't turn out to be all the things promised, superhardening research (for Small ICBM and MX applications) is also being pursued. According to the report, "hardness levels over 25 times that of current U.S. silos [to 50,000 psi overpressure] may be achievable." If that sounds a bit high, one should remember that the Air Force claimed 100,000 pounds per square inch during the "dense pack" era. Reality will no doubt force the estimate back further. High ex-

plosive testing of "scale-model steel clad and steel reinforced concrete structures, with high steel content" began in 1982 and the Defense Nuclear Agency claims the possibility of survival against the "highest yield" Soviet warheads (24 megatons).

The most bizarre work is in the area of deep basing, where at 1,000 feet underground, the Defense Department claims there is "promise for secure basing of ICBMs as well as other strategic assets." According to the Department, "deep basing offers a range of strategic applications beyond ICBM deployment; for example, command and communications centers, satellite reconstitution, and intelligence activities." Research in 1984 will include investigations of "post-attack survivability of personnel and equipment, as well as for post-attack 'dig out' capability." These programs will test the ability of tunnel-boring machines to dig out "100 feet of consolidated rock and approximately 50 feet of rubble to simulate a nuclear crater."

A broad coalition favors the Small ICBM, even though it will not be what its proponents claim or hope. The missile is attractive to many because of the belief that with a single warhead, it would start a "de-MIRVing" trend. But Air Force and government officials see the missile as a complement to MX and multiple-warhead submarine-based ballistic missiles (SLBMs), not as a replacement. The Small ICBM will be procured along with Trident II, MX, new bombers and cruise missiles. They will not reduce the number of counterforce warheads.

THE SCOWCROFT Commission's claim that "Deployment of such a missile . . . would serve stability" is false. Stability is eroded most severely by the lack of reductions in nuclear weapons, not in theoretical vulnerabilities or imbalances. The far-off promise of stability—the defense intellectuals' nirvana—cannot be deferred until 1997, when the Small ICBM is fully deployed.

ICBMs are no longer the only threat to hardened targets. When Trident II is deployed in 1989, it will end the era

when ICBMs were the only prompt hard-target killers, and thus the only "destabilizing" weapons. The Small ICBM may offer a lower-value target to an attacker, but this will not enhance stability. If there are no significant warhead reductions by the time the small missile is deployed in the early 1990s, there will be around 9,000 strategic missile warheads. This will be more than enough to produce greater "vulnerabilities" in land-based missile forces than exist today. In 1992, when there are 100 MX missiles, will military officials admit that the Small ICBM is a waste; that there are sufficient Soviet warheads to cover each launcher as a single target?

Would the Small ICBM even enhance the arms control process? "Midgetman" was previously rejected as a potential MX basing alternative in the late 1970s because in large numbers it violated SALT II limits on the number of strategic launchers. And with respect to verification, *Air Force* magazine suggested in November 1983, that "the Air Force should consider the use of special masking techniques in order to minimize the chance of the Soviets detecting the location of individual SICBMs by means of electronic eavesdropping."

The problem of assessing the new missile's "contribution" to arms control is inseparable from the larger problem of whether new weapons contribute anything. Arms control is not attained by solving problems of weapons modernization. What weapons projects haven't been advocated on the premise that they would promote stability and arms control?

The Small ICBM is a product of the failure of the Reagan Administration's policies. Both on weapons acquisition and arms control, the government has failed to present a coherent plan that could achieve either national defense or arms reductions.

The overall magnitude of current modernization plans, fragmented into numerous individual programs, is the major contributor to instability. The Small ICBM doesn't add (or subtract) anything significant to the practice of weapons acquisition or arms control. □



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NATO may need to take some risks to raise
the nuclear threshold and to relax East-West tensions.

A window of opportunity

by Michael Carver

A MOOD OF COMPLACENCY about the nuclear issue has spread across government circles in Britain and Germany in Orwell's 1984. Pershing IIs have been installed in Germany and Tomahawk cruise missiles in Britain; both, somewhat gingerly and surreptitiously, have moved out of their bases on exercise without any serious protest.

In Germany the Green Party is in disarray; in Britain the Greenham Common women are almost universally regarded as a public nuisance, more interested in feminism than serious argument about nuclear weapons.

The Stockholm Conference, although not directly concerned with nuclear weapon systems as such, opened with a high-level fanfare; the Mutual and Balanced Force Reduction Talks in Vienna have been resumed; and, for no explainable reason, the replacement of the late Yuri Andropov by Konstantin Chernenko as head of the Soviet Union has been hailed with signs of hope.

Both U.S. President Reagan and British Prime Minister Thatcher have adopted not merely a less strident tone toward the Soviet Union, but an almost dove-like coo. In NATO nations, the public is inclined to sigh with relief and turn its attention to other matters: a Presidential election, the troubled political affairs of the Middle East, the financial problems of the European Economic Community.

It would be a serious error for official NATO circles to relax and lose the opportunity to reconsider and reform the Alliance's nuclear policy. That opportunity, arising from the wide and deep public concern over the last few years, was brought about by a concatenation of circumstances. It is only when new weapon systems are being introduced that such opportunities occur. Once these systems are in service, it is next to impossible to get rid of them, until the military-scientific-industrial lobby develops another expensive and probably more horrific replacement. And that, once more, adds fuel to the never-ending technical arms race.

In June NATO acquires a new Secretary-General in Lord Carrington, a man who is not inclined to take for granted

policies which have been regarded as sacred cows for several years. In his 1983 Alastair Buchan Memorial Lecture at the International Institute for Strategic Studies in London, he called for a new, realistic approach to East-West relations. To conclude his remarks he said: "The Alliance needs a soul as well as weapons; collective political brain as well as combined military brawn. We need a strategy."

NATO now has the opportunity to take a radical look at that. There is a very wide spectrum of responsible Alliance opinion which favors raising the nuclear threshold and agrees that a proliferation of short-range nuclear weapons is not only worthless, but dangerous. The Supreme Allied Commander, Europe (SACEUR) belongs to that school, and is supported by some of his predecessors and many of their former subordinates of different nationalities, as well as by many leading scientific and academic experts in the defense field.

Their views are shared by many politicians, not confined to those whose parties, like the Liberal-Social Democrat alliance in Britain, adopt that line as their official policy. What are the keys with which the apparently deadlocked door to progress could be opened?

One is to differentiate between those measures which could be taken unilaterally, without risk to NATO's security, and those which should depend on negotiation with the Soviet Union and therefore, perhaps, involve verification. To make progress in this field one must first overcome the obstacle imposed by those who believe that no reduction in the number of warheads or delivery systems is acceptable without a *quid pro quo*, and that an equivalence among all types must be established before "negotiating from strength," if one is not to be subject to nuclear blackmail.

But that difficulty has already been overcome. Several years ago the United States unilaterally withdrew 1,000 warheads from Europe, and NATO has recently announced the withdrawal of 1,500 more over the next few years. Britain's V-bomber strategic nuclear strike force was replaced by the Tornado aircraft which, although dual-capable, does not aspire to the strategic role. These were unilateral decisions, not dependent on reductions in the Soviet Union's nuclear arsenal.

IF THERE IS such a wide measure of agreement that short-range nuclear battlefield systems, particularly artillery, are irrelevant, why not unilaterally abandon them now, instead of going half-way by withdrawing them 150 kilometers from the intra-German border, as recommended by the Olof Palme Commission? That would be a good



Field Marshal Lord Michael Carver's most recent book is *A Policy for Peace* (1982). He was chief of the Defense Staff of the United Kingdom from 1973 to 1976. Copyright © 1984 Lord Carver.

"START" to a process of challenging, within NATO, the purpose of all the other nuclear systems which are, after all, a product of the U.S. armed forces enthusiasm, in the 1950s, to exploit this new toy.

A first step needed to persuade NATO to move in this direction would be to demonstrate that both the deterrent and the destructive effect, for which NATO now insists that it must have theater nuclear weapons, can be achieved by weapon systems with non-nuclear warheads. That has been one of the main themes proposed by a number of different studies. One is SACEUR's own "Air/land Battle 2000."⁶ And the theme has been supported by *The Economist*, notably in the February 4, 1984 issue.

It is an indication of the trend in attitudes that so conservative a body as the group assembled by the British Atlantic Committee could approve such statements as the following:

The present weapon arsenals are far in excess of the needs of deterrence. There is no security requirement for weapons to include "every rung of the ladder." The concept of controlled, step-by-step, escalation is impractical nonsense in an unpredictable and chaotic situation. The world would, in fact, be a safer place if some of these rungs were removed now. They merely encourage theories of nuclear war-fighting. The West possesses too many weapons systems and means of delivery for the task it is trying to achieve. So too does the Soviet Union.

The contradiction contained in Flexible Response is now emerging into the spotlight of public opinion. An increasing number of people are unhappy with a defence policy over-biased in terms of vast numbers of nuclear weapons which are unnecessary for deterrence, are incapable of use in large numbers, and have little practical significance.

It is now time to question—

(i) whether the West needs slavishly to match the Soviet nuclear armoury at every level. The complaint that one side or another should not be allowed to have a "monopoly" of some particular nuclear weapons system is particularly illogical and has little to do with deterrence.

(ii) Whether the forward location of nuclear warheads any longer makes either military or political sense. From their present dispositions, the Warsaw Pact could destroy many of these delivery systems in quick time. The weapons themselves would present the Allies with the dilemma of "use them or lose them." At the same time, Allied resources are currently diverted to the conventional effort of protecting as well as supplying these advanced depots.

It is arguable that confining all cruise missiles to carrying conventional loads would be a considerable step to clarifying the whole position as to what weapon might be nuclear and what might be conventional. In a significant number of cases there is no way of telling. This is a neglected and deplorable situation. We would suggest that there is an outstanding need for full examination of this problem, which seems to have been largely ignored.

The group which made those statements was chaired by Marshal of the Royal Air Force Lord Cameron, a former chief of the Defense Staff, and included three retired generals, one of whom had been NATO's commander-in-chief, Allied Forces Northern Europe; formerly permanent under-secretary and chief scientist of the British Ministry of Defense; a right-wing Conservative member of Parliament; and a former assistant director of the International Institute for Strategic Studies.

There are undoubtedly many problems to be solved before such concepts could be accepted and put into practice. One of the most difficult, already mentioned, is the current use of delivery systems primarily devoted to nuclear warheads, such as the Pershing type of ballistic missile and the cruise missile in all its forms. The only solution appears to be the abandonment of dual-capable systems, and a clear distinction between those systems employed for delivery of nuclear and those for conventional warheads. Although this would pose as much difficulty in the case of aircraft as it does for missiles, it should not be insuperable.

A way must be found to make the United States and the

*"The Alliance needs a soul
as well as weapons;
collective political brain
as well as combined
military brawn.
We need a strategy."*

Soviet Union realize the futility of pursuing the will-o'-the-wisp of effective counterforce strategies, which inevitably depend on a first strike and some form of superiority over the opponent. If this were done there would be much less difficulty in differentiating between conventional and nuclear delivery systems, since the latter would then be required only for retaliatory purposes.

There could then be no objection to the overt adoption of a no-first-use policy, and the potential for a major reduction in the nuclear arsenals of both major powers would have been created. Negotiations might then be embarked upon with some hope of significant results.

In the course of rationalizing NATO's policies on these lines, the principal question would then be whether there is either a military or a political need to have U.S. nuclear delivery systems based on land in Europe, and, if so, what form they should take and how many there should be. If all that is required is a retaliatory system, in order to convince the Soviet Union that it could not use its nuclear weapons in Europe without running the risk of U.S. reprisal, it is not clear why U.S. nuclear weapons have to be based on land.

If NATO is to take the risks which moving in this direction may involve, a prerequisite is the establishment of greater self-confidence within the Organization. Progress at the Stockholm and Vienna meetings could contribute greatly to that goal, as would a successful outcome to the negotiations in Geneva on the banning of chemical warfare. And the indications for all of these discussions appear at present to be not altogether unfavorable. They could be helped along by the more sensible and relaxed attitude

to East-West relations which Lord Carrington called for last year—a call to which there does, fortunately, appear to have been some response. □

*Other studies include: European Security Commission, *Strengthening Conventional Deterrence in Europe* (New York: St. Martin's, 1983); British Atlantic Committee, *Diminishing the Nuclear Threat: NATO's Defense and New Technology* (London: 1984); the contributions of two former British chiefs of the Defense Staff in John Bayliff, ed., *Alternative Approaches to British Defense Policy* (New York: St. Martin's, 1983).

The failure of the United States and the Soviet Union to reduce nuclear weapons diminishes not only their own security but also that of the NATO allies.

Why missiles in Europe?

by Francesco Calogero

THE EUROMISSILES, namely the Soviet SS-4s, SS-5s and SS-20s now deployed in the Soviet Union, and the U.S. Pershing IIs and ground-launched cruise missiles whose deployment in Western Europe is under way, involve on each side between 500 and 1,000 warheads. The number of "strategic" warheads available to each superpower is close to 10,000, that is, at least one order of magnitude larger. And there are as many, or perhaps more, "tactical" nuclear weapons, most of them deployed in Europe.

This arithmetic suggests that the major relevance of the Euromissile issue is political rather than military. Thus, the main decision for the superpowers and their allies should be whether or not to strive for an agreement on this issue, rather than what the specific terms of such an agreement might be.

Recent developments suggest, however, that both the U.S. and Soviet decision-making systems lack an effective mechanism for assessing candidly the advantages and disadvantages of striking a deal, *as well as the advantages and disadvantages of failing to reach an agreement.* (I introduce the emphasis because it is generally the second aspect that receives insufficient attention.) And one may justifiably doubt whether the leadership in either country is competent and energetic enough to require such a complete assessment and then to act accordingly.

The Soviet Union, for instance, clearly views the deploy-

ment of Pershing IIs in West Germany and ground-launched cruise missiles in Western Europe as a serious threat, in spite of the limited size of the planned deployments. In particular, the argument is often made by Soviet spokesmen that these missiles have a strategic capability against the Soviet Union, unlike their own SS-4s, SS-5s and SS-20s, which cannot reach the United States, except for Alaska. This suggests that a ban on intermediate-range missiles in Europe—along the lines of the original Reagan "zero option" proposal and perhaps applicable on the Eastern side only to those missiles within range of Western Europe—might have served the interests of the Soviet Union better than the failed Geneva negotiations. This failure, of course, resulted in U.S. deployment of the Pershing IIs and cruise missiles. In the context of a runaway nuclear arms race in Europe this development could lead to more extended deployments than those now under way.

Deployment of the Pershing II and the cruise missiles is clearly very costly for NATO, since it produces substantial disarray among its member states and, most importantly, it erodes the broad popular consensus that constitutes the main political and strategic asset of NATO vis-à-vis the Warsaw Pact nations. This suggests, to me at least, that any agreement that might have resulted in cancelling deployment of the new missiles in Western Europe should have been welcomed by NATO.

"THE TROUBLE ORIGINATES neither from the U.S. nor from the Soviet missiles, but from the fact that we are unable to defend ourselves." This slogan looms large on a huge poster in Rome, put in place, of course, by a rightist group. But in less blatant forms this kind of naive nationalism is gaining ground all over Europe, not only in rightist circles, but also among leftists and moderates.

The idea that the quarrels between the United States and



Francesco Calogero is professor of theoretical physics at the University of Rome (00185), Italy. He is a member of the Pugwash Council and executive committee and of the Stockholm International Peace Research Institute's governing board.

the Soviet Union might bring about the nuclear devastation of Europe is causing a wave of anti-superpower feelings, which strengthen the undercurrent of anti-Americanism and of anti-Sovietism that has always existed in Europe whether on the right, the center or the left. These feelings could give impetus to an ugly political trend, based on hate and fear, which might take a catastrophic turn by causing some European countries to opt out of the Non-Proliferation Treaty. Neither the Soviet Union nor the United States is likely to see its security enhanced by such developments. Of course, those surfacing now are early symptoms of a disease that need not materialize. But its emergence would be very serious indeed, and there can be little doubt that an agreement in Geneva, especially one representing a clear step toward arms limitation and détente, would have contributed to stemming this trend, just as the breakdown of negotiations is acting as a nasty stimulant.

More and more European politicians are impressed by the French example—not by France's strategic doctrine and posture, whose phorininess is widely recognized, but by the remarkable political viability of this arrangement, manifested in the near-universal internal consensus it musters. Add to this the arrogance with which the French stance is propagated by its supporters. Thus it is no surprise to discover that top politicians in Western Europe are asking their advisors for an estimate of the cost of a nuclear weapon program, how feasible it might be technically, and so on. As those who have had occasion to consider the matter of nuclear proliferation in technologically advanced countries well know, this is the first step. Just a decision at the top to ask certain questions may be the turning point.

In this context, the role of West Germany is particularly important, although the trouble other European countries might cause should not be overlooked. Thus the fact that the NATO guarantee has come under question in many sectors of German public opinion should be a matter of concern—for the Soviets, who should be the strongest supporters of NATO, if logic prevailed over myopia; and for the Americans, whose leadership propagates an impression of adventuresome naïveté that is hardly reassuring. And it is a matter of concern for everybody else as well, although there is little others can do about a situation that originates from a real security need in West Germany, a need that must be met, one way or another.

Article VI of the Nuclear Non-Proliferation Treaty states: "Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control." But all arms control and disarmament negotiations among the nuclear-weapon countries, and in particular among the superpowers, are suspended indefinitely. Is this not a violation of the Treaty? And is it in the interest of the superpowers (or, for that matter, other nations) thus to weaken the non-proliferation regime? What kind

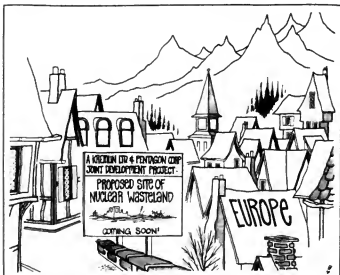
of priority do such considerations get within the decision-making systems of the superpowers and their allies?

THE ARGUMENTS I have made will, I trust, suffice to substantiate my basic point: *Both superpowers appear bent on a course that is detrimental to their own security, as well as to that of their allies and indeed the whole world.* In the Euromissile context this is demonstrated by their failure to agree even though it is in their interest, as well as that of their allies, to do so.

This outcome is, in part, due to an attitude intrinsic to the negotiating process, namely, that the more eager one party is to reach an agreement, the less favorable terms that party is likely to get. Thus, to acquire a strong bargaining position, each side feels it must approach the negotiation without manifesting too stringent and evident a need for agreement. Indeed, such arguments are used to justify much of the concomitant development and deployment of nuclear weaponry.

Moreover, the assessment of any proposed agreement appears to be based on a comparison with a hypothetical, more favorable, deal—one that appears strategically more advantageous and that would be easier to sell to one's own constituencies. The foresight required to assess realistically the disadvantages implicit in the lack of any agreement, and to act accordingly, may require more statesmanship than the U.S. and Soviet political systems are able to muster.

This worrisome conclusion enrols me in the ranks of the anti-superpowers crowd despite my empathy, which goes in the opposite direction. It is a conclusion that emerges clearly if one steps back from the moves and countermoves, arguments and counterarguments, which have accompanied the Euromissile negotiation, and looks objectively at the present predicament. We must hope that the behavior of the superpowers will be rectified, and that the European countries will not, in any case, follow their example, that is, pursue a course that is detrimental to their own security. But these hopes appear at present to be based on wishful thinking rather than on real developments. □



Adrian Raeside, Canada

France believes that its nuclear doctrine both protects its vital interests and assures the French contribution to the Atlantic Alliance.

The French defense

by Georges Fricaud-Chagnaud

FOR THE PAST 25 YEARS French defense policy has been characterized by a remarkable continuity, in spite of changes in other fields. The fact that it is necessary to reexamine this subject illustrates:

- the persistence of prejudice related to the withdrawal of France from the NATO military command;
- perhaps a certain failure to explain our rationale;
- but also a refusal on NATO's part to consider a different strategy.

Yet today it is clear that France has been able to remain faithful to its Western commitments while not accepting limitations on its national sovereignty. We can even add that France is conscious of being a stronger and firmer ally because it considers itself master of its own destiny, largely due to a unique strategy of deterrence.

The national consensus concerning France's defense effort, deterrence strategy, participation of the country's youth in this defense through national service, and adherence to the Atlantic Alliance, has recently been confirmed by the passing of the Military Program for 1984-1988 and the 1984 budget. Therefore, on the basis of these texts, we will reexamine a steady, yet misunderstood, policy.

THE THREE main objectives reasserted during the parliamentary debates are:

- preserving the credibility of our nuclear weapons by maintaining them at a threshold of sufficiency, even for a second strike;
- strengthening France's capacity to fulfill its commitments to the Atlantic Alliance through a concept of use and of means better adapted to strategic contingencies and to technological evolution.
- Improving our rapid assistance capacities, the better to safeguard our primary interests overseas and to fulfill the obligations of our defense agreements.

In fact, there is a close relationship between strategic and tactical nuclear forces and conventional forces within a global deterrence strategy. Nuclear and conventional forces enhance each other's value and perform their missions—

first through their existence, then through their maneuvering, and eventually, if necessary, through their commitment.

The strategy by which the weak can deter the strong constitutes the originality of French nuclear doctrine. Made possible by the equalizing power of the atom, it is based on the ability, even in the case of a second strike, to inflict instant damage upon a possible aggressor on his own territory—damage greater than the aggressor's gain in attacking us.

The credibility of French deterrence, linked with the credibility of the weapon systems of Mirage IV aircraft, missiles of the Plateau d'Albion and modern ballistic-missile submarines, is now recognized. In fact, the specific role of French deterrence was acknowledged by our allies in the Atlantic Alliance (1974 Ottawa Declaration). Far from weakening Western defense, the independence in decision-making to which France is so attached reinforces this defense.

Since it is a matter of defending France's vital interests, our strategy can only be an anti-city strategy; otherwise, it could mean war (conventional perhaps, but destructive and therefore unacceptable), or servitude. We refuse them both. This is also why France refuses to be limited by conventions such as "no first use," which reduce the deterrent power of nuclear armament. Once again, deterrence aims at assuring peace, not at preparing for atomic conflict. Pope John Paul II, in his June 1982 address to the United Nations, reemphasized the legality of deterrence.*

However, it must also be noted that French vital interests are not strictly geographic in nature, nor can they be restricted to territorial dimensions. Political, economic and, by definition, multiple, changeable and circumstantial, it is difficult to define these interests with any precision. It is the enemy who must evaluate their boundaries and weigh the risk of an erroneous assessment.

France also possesses tactical nuclear weapons which can be delivered by Jaguar aircraft or by SS-Pluton missiles. In case of aggression, the use of these weapons would mark the last warning prior to initiating the strategic nuclear response. It would be out of the question to use them as "super" artillery, no matter what size of weapon was used. As with strategic nuclear weapons, the President is responsible for their use. The replacement of the Pluton missile by the Hades, three times greater in range, and the centraliza-



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*See also the declaration of the French bishops (November 1983) and the communiqué of the Bellerive Group (December 1983), under the aegis of Saddrudin Aga Khan.

tion of all Hades systems into one nuclear division under the direct command of the chief of staff of the armed forces, aim at strengthening the link between tactical and strategic nuclear weapons. Therefore, the French concept of a final warning cannot be related to NATO's flexible response, which appears to us to contain the germ of an acceptance of war, as well as the risk of an arms race.

Finally, our concept of defense also relies on the existence of powerful, modern and multi-role conventional units capable of forcing the enemy into a major engagement. By discouraging limited conflicts, they insure that deterrence is not weakened. Although France refuses to enter into a conflict against its will, these conventional forces, part of which are stationed in Germany, must be able to prove that France is a loyal and faithful ally within the Atlantic Alliance.

In this connection, the creation of "rapid assistance forces," the basic element of which will be an anti-tank helicopter division, is particularly significant. In addition to their possible use overseas, these forces will also have the capability to enter the European theater almost immediately—another proof of our determination.

In our opinion this resolution, combined with the capabilities of our nuclear forces, contributes heavily to avoiding aggression against our European partners. France, however, does not feel able to give any country whatsoever a nuclear guarantee, a guarantee which, in any case, has never been requested.

THE VERY BROAD agreement on this deterrence strategy, the faithfulness to the alliance, and the conviction that major and ultimate decisions should be made only by national authorities explain to a large extent France's calm resolution amidst the current turmoil. But while France has yielded neither to pacifist movements nor to the terrors of the nuclear apocalypse, it nevertheless remains attentive to global developments and to the risks entailed.

This is why, although refusing to enter the arms race, France desires a balance of deterrence based on a correlation of forces at the lowest possible level. Therefore, it hopes for a resumption of START negotiations between the United States and the Soviet Union, aimed at reducing their central nuclear arsenals. These talks should ensure a balanced deterrence between the superpowers. The stability of the ABM system is one of its basic elements.

Deployment by the Soviet Union of new intermediate nuclear weapons has deeply affected security conditions in Europe. Setting up a new balance of forces in favor of the Soviet Union could lead to a break between Western Europe and the United States. Also, the perception of an imbalance could lead either to submission or to the opposite—an irrational race by both sides to "over-arm." This is why France has approved of the installation of Pershing II missiles in Europe, and why the French President reminded the United Nations that peace can last only on the basis of a real equilibrium: "It is by respecting this golden rule that each nation's rights to independence and security will be reconciled."



Bas, Greece

France was not involved in the Euromissile negotiations (INF) in Geneva. As a matter of fact, our deterrent force constitutes a central defense system which is essential and barely sufficient for the country's security. Our independent strategic weapons, therefore, should not be taken into account during U.S.-Soviet talks dealing with theater nuclear forces, which represent only a portion of their massive strategic arsenal. France, however, does not reject the idea of an eventual debate among the five nuclear powers, leading to a lasting limitation of their strategic systems. Prior to such debate, it would be necessary for the superpowers to reduce their overabundant nuclear arsenals, to correct imbalances between conventional forces, and to strictly prohibit biological and chemical weapons. Finally, a firm agreement should be concluded to prohibit ABM weapons, which are the very negation of deterrence.

On a regional level, France put forward, in 1978, the idea of a European disarmament conference which would gather the 35 states that signed the final Helsinki document. This conference, which began early this year in Stockholm, should serve to reintroduce the geographic and historic dimensions of Europe with a view to establishing better mutual knowledge of military activities, resulting in greater confidence among countries from the Atlantic to the Urals.

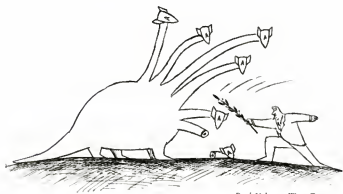
IN A WORD, nothing can be done without an awareness of the need for a strong national defense among the citizenry, dedicated under all circumstances to preserving both national independence and security, guarantees of their personal freedom. Deterrence and allegiance to the Atlantic Alliance are the two main pillars of French defense policy, which are also consistent with its foreign policy and its policy on disarmament. They are all parts of a single security whose goal is to reduce world tensions—a peace policy.

This is why the French were in Lebanon as soldiers of peace. This is why they answered the appeal from the Chadian government when that country became the victim of external aggression.

This determination to respect our history and duties shows that France does not view its defense in a restrictive sense and demonstrates our commitment to peace within the context of our ideals. □

The real danger of nuclear weapons in the Third World is not that developing countries will acquire them but that advanced countries will intervene in Third World affairs with them.

Regional conflicts and nuclear fears



Paul Valéry, West Germany

by K. Subrahmanyam

IN THE CURRENT international environment it is difficult to define a local conflict. From the end of World War II until the end of the Falklands confrontation there have been 148 conflicts and barring perhaps ten all have taken place in the developing world. In 64 of the wars that took place up to the end of 1976 there were interventions by capitalist countries, in six by socialist countries and in 17 by other Third World countries.¹ Similarly, the Brookings Institution has calculated that there were 215 instances of use of force without war by the United States between 1946 and 1975,² and 195 like instances by the Soviet Union.³

The Stockholm International Peace Research Institute (SIPRI) has calculated that between 1978 and 1982 only 3.6 percent of the Third World's arms supplies originated in those countries; the rest came from the industrialized nations.⁴ Obviously, most of the conflicts in the Third World can be sustained over a period of time only through overt or covert support from the developed countries. It is therefore difficult to define a strictly local conflict in the poorer countries. Most Third World conflicts are linked with superpower confrontation or with some regional hegemonic power which in turn leans on a superpower for supply of weapons and equipment.

Nuclear weapons can play a part in Third World conflicts in two ways: a recognized nuclear weapon power can threaten to use the weapon in the conflict situation; a clan-

destine nuclear power such as Israel or South Africa may do so. The U.S. declaration in regard to the use of nuclear weapons highlights this possibility. The declaration guarantees:

not to use nuclear weapons against any nonnuclear weapon state party to the Nonproliferation Treaty or any comparable international binding commitment not to acquire nuclear explosive devices, except in the case of an attack on the United States, its territories or armed forces or its allies by such a state allied to a nuclear weapon state or associated with a nuclear weapon state in carrying out or sustaining the attack.⁵

The phrase "associated with a nuclear weapon state" can be interpreted according to one's convenience and inclination. The attack by an adversary state need not be a nuclear attack to justify a U.S. resort to nuclear weapons. Also, the declaration leaves it vague whether an attack on U.S. armed forces would also include a counterattack by a country if the United States had launched the first attack.

The United States considered the possible use of nuclear weapons in Vietnam, after the fall of Dien Bien Phu and in the Quemoy-Matsu crisis, which was a local clash between China and Taiwan; and there was a nuclear alert during the Arab-Israeli war.⁶ Use of nuclear weapons was also contemplated during the Korean and Vietnam wars.⁷ In all these cases the adversary had no nuclear weapons. The interventionism of the industrialized nations—most especially the superpowers—and their tendency to resort to nuclear threats are the primary causes underlying Third World nuclear insecurity. Apologists for intervention often seek to obfuscate this issue by suggesting that prestige is the most important factor in proliferation.

The other source of nuclear threats in the Third World lies in the clandestine nuclear arsenals in the hands of nations like Israel. Pakistan is attempting to reach nuclear weapons capability. As Stephen Cohen of the University of Illinois writes:

Pakistan belongs to that class of states whose very survival is uncertain, whose legitimacy is doubted and whose security related resources are inadequate. Yet these states will not go away, nor can they be ignored. Pakistan (like Taiwan, South Korea, Israel and South Africa) has the capacity to fight, to go nuclear, to influence the global strategic balance (if only by collapsing).⁸

The states mentioned above have close links with the United



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States, and their military establishments are to a considerable extent influenced by U.S. military doctrines. The only other developing nations that fall into the category of near-nuclear weapon powers are India, Argentina and Brazil.

It has been fashionable among certain Western writers to stress the possible dangers of developing nations acquiring nuclear weapons, while they maintain that such weapons in the hands of five recognized nuclear-weapon powers are quite safe. But historical evidence does not support this view. Indians and Pakistanis, Arabs and Israelis, have fought a number of wars. Deplorable as they are, relatively speaking they were fought with a great degree of restraint, unlike the war in Vietnam where more explosives—the equivalent of many megatons—were used than in all history up to that time. Genocidal bombing was part of the Western conventional military doctrine, including the destruction of cities through thousand-bomber raids, a doctrine that led logically to Nagasaki and Hiroshima. Seymour Hersh in his book *The Price of Power* recorded a drunken President talking of “nuking” the Vietnamese.⁹

Those who try to frighten the world with the idea of nuclear bombs in the hands of irresponsible Third World rulers should ponder the equal risks of these weapons in the control of the developed nations. Daniel Ellsberg has written about the authority to use nuclear weapons having been delegated since the days of President Eisenhower.¹⁰ There has been talk of “prior release” orders in regard to tactical nuclear weapons if the threat of use of nuclear weapons in a tactical scenario is to be credible at all.¹¹ There is no reason to believe that the leadership of any developing country is likely to be more rash in resorting to the weapons than the leadership in the industrialized countries.

Kenneth Waltz in, “The Spread of Nuclear Weapons: More May Be Better,” writes:

New nuclear states will confront the possibilities and feel the constraints that present nuclear states have experienced. New nuclear states will be more concerned for their safety and more mindful of dangers than some of the old ones have been. . . . While nuclear weapon powers have spread, conventional weapons have proliferated. Under these circumstances wars have been fought not at the centre but at the periphery of international politics. The likelihood of war decreases as deterrent and defensive capabilities increase. Nuclear weapons, responsibly used, make wars hard to start. Nations that have nuclear weapons have strong incentives to use them responsibly. These statements hold for small as for big nuclear powers. Because they do, the measured spread of nuclear weapons is more to be welcomed than feared.¹²

As pointed out earlier, the risks of the recognized nuclear weapon nations using the weapons in intervention operations in the developing world remain significant. China and the Soviet Union have offered a no-first-use pledge while the Western powers maintain their first-use doctrine, not

necessarily restricted to the European context or even to nuclear adversaries. The use of nuclear weapons in certain contingencies in the Korean Peninsula and in the Persian Gulf region has been discussed in various examples of strategic literature.¹³ Analysts estimate that Israel has perhaps 200 nuclear warheads.¹⁴ Given Israel's superiority in sophisticated conventional weapons and the U.S. commitment to Israel, the probability of that state being compelled to resort to nuclear weapons against its Arab neighbors appears to be low. South Korea currently has no access to weapons-grade plutonium and may not be able to produce nuclear weapons of its own in the near future. Taiwan can, but since its adversary is China, with enormous nuclear capability, it would appear that Taiwanese weapons if they are produced at all will be used only as a deterrent to resist forcible annexation by China.

Even if Brazil or Argentina should acquire nuclear weapons it is difficult to envisage contingencies in which they will find it necessary or advantageous to use them. The British deployment of nuclear submarines and the torpedoing of the *General Belgrano* may persuade the Argentinians of the advantages of nuclear-propelled submarines but their use of nuclear weapons does not appear to be a rational possibility.

*Most conflicts in
the Third World can be
sustained only through support
from the developed countries.*

Again in the Indo-Pakistani context, if both countries were to develop nuclear weapons, probability favors an evolving situation of stable mutual deterrence. India is a *status quo* power which does not favor any alteration of existing boundaries by use of force. Within Pakistan the view that the problem of Kashmir should be left for a future generation to settle is gaining ground. There is clear realization in Pakistan that if it were to go nuclear India would overtake it both in size and sophistication of arsenals.

The history of the last four wars shows that neither side is inclined to resort to indiscriminate and excessive use of force even under war conditions. Millions of divided families live on both sides of the border and this will be one of the major restraining factors.

There has been concern in Israel about the development of a Pakistani nuclear arsenal and its being made available to an Arab country. This appears to be an exaggerated fear for two reasons. One is that the Arabs are aware of the size and capability of Israel's nuclear arsenal, and many Arab capitals are within striking distance of Israel. The other is that Pakistan knows full well that if a nuclear weapon was used against Israel the source of the weapon would

be attributed to Pakistan, which might then face retaliation from the United States, whose nuclear forces are deployed in the Indian Ocean area. One may therefore rule out this eventuality also.

That leaves the possibility of South Africa's use of nuclear weapons against the frontline black African states. This is the most credible among the scenarios in the developing world; racism and genocide go together. As the pressure on the South African white minority increases through armed struggle, the racist regime may attempt to blackmail neighboring states to prevent them from extending support to the freedom fighters within South Africa. Thus, the possibility of a nuclear "demonstration" cannot be ruled out.

Within the next 10 or 15 years the high probability of nuclear weapons use in the developing world arises only with respect to intervention operations by established nuclear powers against developing countries, and by South Africa against black African states. In the former case the neutron bomb, which produces high casualties with little collateral damage, may be a preferred weapon.

The Nuclear Non-Proliferation Treaty legitimizes the possession and use of nuclear weapons and unlimited vertical proliferation by the recognized nuclear weapon powers. It is highly probable that there has also been clandestine weapons production by Israel and South Africa. Seventeen nations have affirmed their right to resort to nuclear weapons, in defiance of the international community's demand that the use and threat of use of nuclear weapons be declared a crime against humanity.¹⁵

The vast literature on the so-called proliferation problem in the 1960s and 1970s has served to draw attention away from the galloping vertical proliferation in recognized nuclear arsenals and the existence of two clandestine nuclear arsenals. Most of the discussion about the use of nuclear weapons by countries which are not yet able to produce even a field gun—about their fabricating nuclear weapons with reactor-grade plutonium, which no nation in the world has ever done—appears to be an extension of the obfuscation exercise that started over 20 years ago.

There is an unconscious racial bias involved in the nuclear proliferation issue. The industrialized nations rely on nuclear war doctrines for their security but deny that right to other nations. The two clandestine nuclear powers who have gotten away with it are European-settled nations—Israel and South Africa. Many of the wars and major instances of inter- and intra-state violence in the developing world are attributed in part to the interventionism of the industrial powers, but a majority of those instances do not receive much attention in the literature. Of late, there is also a trend to focus excessive attention on the growth of defense industries in the developing world, even as the industrialized nations move into sophisticated technologies which are likely to make interventionist wars cheaper.

NUCLEAR WEAPONS are unjustifiable in anyone's hands. The countries that occupied vast areas of the world

during the colonial period and exploited the majority of humanity may be planning to use them in defiance of overwhelming international opinion. Their attempt at domination and perpetuation of the weapons culture must therefore be opposed with various measures, including development of deterrent nuclear weapons by nations which are victims of such domination.

Those who support the legitimacy of nuclear weapons in the hands of a few nations by supporting the Non-Proliferation Treaty cannot logically and credibly preach that other nations cannot have them. The argument that the Treaty constituted a step-by-step approach to a disarmed world is patently fallacious, as witnessed by the galloping vertical proliferation since it went into effect.¹⁶ The fact that it has been accepted by a large number of nations does not make it any more legitimate than imperialism, which was also accepted by a world majority in its day.

The Non-Proliferation Treaty is pernicious because it legitimizes the use of nuclear weapons by a few weapon powers. Unless it is resisted, more and more nations will be compelled to accept the legitimacy of nuclear weapons use. It will be argued that there is a rising trend of opinion in favor of "no first use." But even as this trend has developed there are discussions on the use of nuclear weapons in areas where nations—Iran and South Korea, for example—have acceded to the Treaty. Armed forces are being increasingly nuclearized and nuclear war-fighting doctrines are being advanced. The anti-nuclear feeling in Western Europe and North America, which is as yet not potent enough to have an impact on government policies is welcome, but it is not a sufficient assurance to the developing world that nuclear weapons will not be used. It was when anti-imperialist feeling was widespread and imperialism was retreating that the bloodiest colonial wars—in Algeria, Vietnam, Southern Africa—occurred.

While murder is recognized as a crime, killing in self-defense is considered to be legitimate. If it is lawful for a few nations, which have a record of imperialist behavior and which continue their hegemonism, to have nuclear weapons so should it be for others—especially in self-defense against interventionism.

Those interested in reducing the danger of nuclear weapons use by interventionist powers and the two clandestine nuclear powers should mobilize collectively to make nuclear weapons illegal. Such a move would be mostly directed against the existing arsenals because, with a few exceptions, the developing nations are in no position to develop nuclear weapons. A delegitimization campaign needs two essential steps:

- There must be pressure on the NATO nations and their allies to join the rest of the international community in declaring in the U.N. General Assembly that threat of use, and the actual use, of nuclear weapons are crimes against humanity. These states should accede to the proposed convention to ban the use of nuclear weapons along the lines of the Geneva Convention on chemical weapons.
- If the NATO nations and their allies do not take this

step, the developing nations which are signatories to the Non-Proliferation Treaty should serve notice that they will withdraw from the Treaty.

The Treaty can be deemed legitimate only if it is universally accepted that use and threat of use of nuclear weapons are illegal and there is a time-bound program on the part of the nuclear weapon powers to reduce their arsenals. Otherwise the Treaty will continue to be an instrument to legalize nuclear arsenals and unlimited proliferation.

Since most of the signatories to the Treaty are not in a position to acquire nuclear weapons, their accession to the treaty has only served to legitimize nuclear arsenals and their vertical proliferation. The withdrawal of these countries from the Treaty will not add to proliferation risks. Rather, it will constitute a political protest against the continuing proliferation of nuclear weapons and attempts to legitimize them. In this way, the weakness of the non-nuclear nations can be converted into strength. The threat to withdraw should reinforce the peace movements in those nations whose governments continue to assert the legitimacy of use and threat of use of nuclear weapons.

The Secretary General of the Organization of African Unity has urged that African nations develop nuclear weapons as a deterrent against South Africa,¹⁷ but that is not feasible. The collective threat by the African states to withdraw from the Treaty would be a more credible way to work toward making nuclear weapons illegal. □

1. Istvan Kende, "Wars of Ten Years," *Journal of Peace Research*, 15, no. 3 (1978).
2. Barry M. Blechman and Stephen S. Kaplan, *Force without War* (Washington, D.C.: The Brookings Institution, 1978).
3. Stephen S. Kaplan, *Diplomacy of Power: Soviet Armed Forces as a Political Instrument* (Washington, D.C.: The Brookings Institution, 1981).
4. Stockholm International Peace Research Institute, *SIPRI Yearbook 1983* (London: Taylor & Francis, 1983), p. 272.
5. CD/139 quoted in the U.N. "Report on Nuclear Weapons" (1980).
6. The threats, other than that of 1973, are listed with original citations in K. Subrahmanyam, "The Role of Nuclear Weapons in International Relations," *The Institute for Defense Studies and Analyses Journal* 3, no. 1 (July 1970).
7. *Ibid.*
8. Stephen P. Cohen, "Pakistan," in *Security Policies of Developing Countries*, Edward A. Kolodziej and Robert Harkavy, eds. (Lexington, Massachusetts: Lexington Books, 1982), p. 94.
9. Seymour Hersh, *The Price of Power* (New York: Summit Books, 1983), p. 396.
10. Daniel Ellsberg, interview in *Nuclear Armaments* (Berkeley, California: The Conservation Press, 1980).
11. Lord Solly Zuckerman in *Dangers of Nuclear War*, Franklyn Griffiths and John C. Polanyi, eds. (Toronto: University of Toronto Press, 1979), pp. 164-65.
12. Kenneth Waltz, "The Spread of Nuclear Weapons: More May Be Better," *Adelphi Paper* 171 (London: The International Institute for Strategic Studies, Autumn 1981).
13. The Union of Concerned Scientists, *No First Use* (Feb. 1, 1983), Cambridge, Massachusetts.
14. Bangkok Post (May 14, 1982).
15. U.N. General Assembly, Resolution 36/92, Dec. 9, 1981.
16. Between 1968, when the Non-Proliferation Treaty was signed, and 1982 the number of nuclear weapons (warheads) in the hands of the United States and the Soviet Union rose from 5,350 to 19,000. Ground Zero, *Nuclear War: What's in It for You?* (New York: Pocket Books, 1982), Table C-1.
17. *Hindu* (Madras, June 11, 1983), quotes Edem Kodjo, outgoing Secretary-General of the Organization of African Unity, speaking at Addis Ababa.



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The Cadillac Ranch, a roadside attraction 80 miles west of Amarillo, Texas, on Route 66. © Ant Farm 1981.

The future of the automobile depends not only on markets and fuel costs but also on land availability and pollution problems.

Automobiles: a hazy future

by Lester R. Brown

IN THE RAPIDLY changing resource and economic milieu of the late 1970s and early 1980s the future of the automobile has received too little attention. The only question seems to have been the source of future fuel supplies. It has been assumed, perhaps too readily, that synthetic fuels could quickly replace gasoline and diesel fuel.

Within the auto industry, many believed it was only a matter of time until the automobile became the centerpiece of transportation systems everywhere. A 1978 study of the world automobile industry projected that the world fleet would expand from just under 300 million vehicles at the time to some 700 million by the year 2000, reaching one car for every eight people. Yet projections such as these are not materializing, largely because they were based on a narrow information base and a correspondingly narrow set of

considerations and failed to account for a long list of emerging resource, economic and political constraints.

Resource constraints arise, for example, because automobiles require not only fuel but land as well. In densely populated China, where land is scarce, the private automobile is virtually unknown. International indebtedness on an unforeseen scale in the Third World and in Eastern Europe is restricting automotive fuel imports in scores of countries. At the individual level, the narrowing margin of global economic growth over that of population is preventing the rise in affluence needed if car ownership is to spread as projected. During the first half of the twentieth century, auto production and ownership were concentrated in the United States. Indeed, as recently as 1950 two-thirds of the world's automobiles were owned by Americans. It was not until 1968 that the rest of the world finally caught up. Since then, two-thirds of the growth in the fleet has occurred outside the United States.

As the 1970s began, automobile ownership in the United States and the industrial countries of northwestern Europe was nearing saturation, so that the market for new vehicles is dominated by replacement needs. The large, undeveloped markets appeared to be in Eastern Europe, the Soviet Union and the Third World, where the private car was still a



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cherished status symbol. In the late twentieth century, automobile production has emerged as the world's leading manufacturing industry. With numerous linkages both backward toward the raw material suppliers and forward toward those businesses associated with car sales and maintenance, it is sometimes referred to as the "industry of industries."

A vigorous auto industry has emerged in Japan in recent decades. Although automobile manufacturing had scarcely begun in that country in 1960, the industry grew at a remarkable rate. In 1980 Japan produced 7 million autos, compared with 6.3 million American-made cars. For the first time since the automobile age began, the United States was no longer the world leader. In contrast to the U.S. industry, Japanese automakers have been heavily export-oriented, producing cars that could be marketed throughout the world. The oil price increases in 1973 and 1979, which greatly strengthened the market for the smaller, more fuel-efficient Japanese models reinforced their success. The combination of fuel efficiency, quality engineering and low price has made Japanese cars formidable competitors in markets everywhere—so formidable, in fact, that by the early 1980s the United States and several European countries were pressing the Japanese to limit their exports voluntarily.

GIVEN THE NEAR universality of oil as an automobile fuel, that the automobile's fate is closely tied to the price of petroleum is not surprising. The oil price hike of 1973 caused world auto production to drop to 25 million in 1975. As the price of oil stabilized in the mid-1970s and as the real price of gasoline again began to decline, the demand for automobiles resumed an upward climb. By 1978 production reached 31.8 million vehicles, the highest ever, and 1979 nearly matched that level. But after these two back-to-back records, production fell for three consecutive years. There was a slight upturn in 1983, though output that year was still some 15 percent below the peak years of 1978 and 1979.

From 1950 to 1973, when oil cost two dollars per barrel, oil production increased at 7.6 percent per year and automobile production at an almost equally phenomenal annual rate of 5.8 percent. The 1973 oil price increase to \$12 per barrel markedly slowed the production of both petroleum and automobiles. Six years later, the second oil price hike actually triggered a decline in the production of both, with the annual drop in each case exceeding 5 percent over the next three years.

The decline in global automobile production since 1979 has not been distributed evenly among the world's principal manufacturers. In both the United States and Western Europe, the fall-off was disproportionately great. In the United Kingdom a long-term decline resulting from gradual loss of competitiveness has been accelerated by the changing automobile market and rising fuel prices. In Japan, however, production actually increased in 1980 and then reached a plateau during the early 1980s. In 1981 the automobile industry in North America was producing at 66 percent of

capacity, in Western Europe at 79 percent of capacity, and in Japan at full capacity.

In the Third World, the 1979 oil price rise effectively checked growth of the dynamic Brazilian automobile industry. Although somewhat protected by its increasing production of sugarcane-based alcohol fuel, Brazil was nonetheless affected by the overall downturn in global economic activity. Not only did automobile exports level off, but the severe internal economic stresses led to a sharp decline in domestic sales as well.

Another of the world's most dynamic developing economies, South Korea, also found itself in difficulty in this sector. A latecomer to automobile assembly, the Korean industry, with the direct support and encouragement of the government, had been planning a severalfold increase in automobile output within a few years. By 1980, however, it was using only 30 percent of its total production capacity of 235,000 vehicles per year. Caught in the early phase of rapid expansion by the 1979 oil price increase, the country's export-oriented industry faced intensified competition and, in many cases, import restrictions in the major markets.

This fall in automobile production since 1979 is only partly due to soaring fuel prices and high interest rates. The slowdown in global economic growth since 1979—to the point where overall world economic growth barely matches

*Heavily burdened with debt,
many nations can no longer
afford to import oil for an
ever-expanding automobile fleet.*

that of population—has also contributed. The result is stagnating per capita income and purchasing power. Without income gains, the number of consumers who can afford automobiles will remain limited. In addition, governmental tax policies in many countries are discouraging automobile ownership. In many Third World countries that do not assemble their own automobiles, import duties are used to discourage vehicle ownership. The combination of these economic trends dampening consumer demand and governmental policies discouraging car ownership may prevent a resumption in the growth in demand for automobiles that has characterized most of this century.

TYPICAL of projections for the world automobile fleet is a 1979 Organisation for Economic Co-operation and Development study that projected world automobile ownership would expand at a steady 3 percent per year during the 1980s and 1990s, nearly doubling fleet size by the end of the century. David Bayliss, transport planner for the Greater London Council, has compiled the results of 18

studies, all but three done in the 1980s, that project annual automobile sales to the year 2000. The highest projected for that year is 72 million, in a study completed in 1978. This would be more than double the peak figure of just under 32 million in 1978 and close to triple the 27 million sold in 1983. At the low end of the spectrum, a 1983 study projected that 46 million cars would be sold at the end of the century, a 70 percent increase over 1983 sales.

Even studies done after the 1979 oil price increase show continuing substantial growth in the world automobile fleet. The average of the set of projections summarized by Bayliss anticipates 550 million cars by the end of the century, an increase of nearly four-fifths over 1980. Associated with this would be growth in annual sales from about 30 million in 1980 to 42 million in 1990 and 56 million in the year 2000.

Unfortunately, most projections are based on a narrow set of conventional assumptions which exclude the many new factors shaping the automobile's future. Few, for example, appear to have accounted fully for the cost of developing alternative fuels. Nor have any given serious considera-

*In densely populated China,
where land is scarce,
the private automobile
is virtually unknown.*

tion to the equity issues arising as the changing economic outlook permanently limits automobile ownership in most East European and the Third World countries to a small elite.

Although questions about the future of the automobile initially arose from the sharp increase in fuel costs in 1973, during the following decade numerous other factors led governments and individuals to reexamine the role of the automobile. These other influences on the auto's future include land availability, the cost of vehicle ownership and maintenance, the saturation of some markets, the slowdown in economic growth both globally and in particular nations that would otherwise develop an auto manufacturing sector, the extent of international indebtedness, urban traffic congestion and air pollution, and a decline in the status traditionally accorded auto ownership.

Fuel costs influence the way national policy-makers as well as potential owners think about the automobile. National governments are concerned with how fuel costs boost foreign exchange outlays if the country is among the overwhelming majority that import oil. For the individual, fuel costs which rise faster than real income discourage auto use and ownership. And that's just what they are expected to do. The cost in real terms has risen markedly over the

past decade and is projected to continue to rise throughout the rest of this century. Although world oil prices may decline in the short term, as in 1983, the long-term trend is clearly upward.

An automobile-centered transportation system is land-intensive. Parking a subcompact car requires a 10-by-20-foot plot of land, so a parking lot to accommodate 200 vehicles requires an acre. In addition to several parking spots per automobile, land is required for streets, roads and highways. In some densely populated countries there is not enough land to support a fleet of automobiles. China, for example, which has only one-tenth of a hectare of cropland per person, simply has no room for cars. This is one reason why China, which exports a million barrels of oil a day, has virtually no private automobiles. Other areas unable to develop a full-fledged auto-centered transportation system because of land shortages include Bangladesh, Egypt and the island of Java, where most Indonesians live.

Only relatively affluent individuals can afford to purchase and operate an automobile. Without an income well above the world average, such a costly transportation vehicle is far beyond the range of consumers. Until recently, it was widely assumed that income levels throughout the world would continue to rise rapidly for the indefinite future, thus bringing cars within the range of more and more people. With the slowdown in global economic growth, however, particularly since 1979, gains in per capita income have been modest, creating few new automobile owners.

At the affluent end of the economic spectrum, some national markets are becoming saturated with automobiles. The United States, for example, is approaching market saturation, with more than half as many cars as people. So, too, are other affluent industrial societies, such as West Germany, France and Italy, with an average of one car for every three people. The United Kingdom and Japan are also probably nearing the saturation point, partly for space reasons. Most Third World countries, on the other hand, are far from saturation. Mexico, an oil exporter, has one car for every 21 people, while Brazil, an oil importer, has one for every 16. The world average is 14 people per car, a figure that is a far cry from either two people per car in the United States or 18,000 per car in China.

AS ECONOMIC growth slows, so does growth in public revenues—the very moneys needed to create the infrastructure of streets, roads, highways and bridges to support automobiles. With national budgetary deficits on the rise almost everywhere, public outlays for such things will be harder to come by. Likewise, slower growth will make it more difficult for the private sector to amass capital for investment in new manufacturing capacity, especially on the scale needed if sales are to double by 2000. Countries where fleet expansion is projected will require additional capital for investment in dealerships, service stations and repair garages.

The growth in international indebtedness during the late



The congested highways of Los Angeles have come to represent the ugly consequences of U.S. reliance on the automobile.

1970s and early 1980s, which reached an astronomical \$750 billion during 1983, is concentrated in Eastern Europe and the Third World, in precisely those countries where the greatest growth in autos is projected. Heavily burdened with debt, many of these nations can no longer afford to import oil for an ever-expanding automobile fleet. Indeed, the International Monetary Fund, to assist governments with foreign exchange deficits, often imposes a higher price or tax on gasoline, among other conditions. In short, for many countries the existing international debt situation, which is likely to dominate national economic policies and priorities well into the 1990s, is not conducive to the continuing evolution of an automobile-centered transportation system.

Countries that export petroleum as well as those that import it are reassessing the automobile's future. Under prodding from the International Monetary Fund to boost federal revenues and reduce domestic oil use, the Mexican government raised gasoline prices sharply in 1983. Although the new price of 70 cents per gallon for regular gasoline (at the official exchange rate) was still low by international standards, it represented a sixfold increase, in peso terms, from the price at the beginning of 1983. Politically unpopular though it was, this raising of gasoline prices closer to world levels helped reverse the trend in oil consumption, which had grown some 10 percent per year from 1976 through 1981. Brazil was also forced to raise the price of gasoline in mid-1983, by 40 percent, before the Fund would agree to provide assistance.

In an effort to reduce oil imports and to maintain its international credit-worthiness, Yugoslavia adopted a rationing system in 1982 that limited motorists to 13 gallons per month. Poland, which is in arrears in interest payments on its international debt and which imports oil, has adopted stringent controls on gasoline use. In late 1983, gasoline purchases were rationed to nine gallons per month, not nearly enough to permit regular use.

Questions of equity also arise in considering the future

of the automobile. Although owning a car is essential to the existing life-styles of ruling elites in the Third World, it will become more and more difficult to justify the use of a large share of a country's foreign exchange to import fuel, parts or even new vehicles themselves. Earlier, when it could be assumed that rapid economic growth would continue exponentially, it was reasonable to think that most people who wanted a car would eventually own one, regardless of where they lived. As it becomes clear that this is not a reasonable prospect, the use of the technology itself, which is elitist in nature, will be increasingly questioned.

YET ANOTHER constraint on autos is growing urban traffic congestion. Long a problem in the countries that first turned to the automobile, it is now a cause for concern in many Third World cities as well. Monumental traffic jams that can last for hours regularly occur in Mexico City, Lagos and Bangkok. Air pollution, too, is a serious problem, particularly in the Third World. Seoul and Mexico City now reportedly have some of the worst air pollution anywhere, largely because of auto emissions. The combination of traffic congestion, traffic noise and air pollution has led many cities to impose restrictions on the use of automobiles,

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ranging from increased bridge tolls in Manhattan to restrictions on cars carrying only one person in Singapore.

Even some affluent societies, particularly those that import oil, are beginning to have second thoughts about the future of the automobile. Prominent among them are Denmark and Sweden. For Danes, who pay for their imported oil largely with farm products, the shift in the terms of trade between oil and agricultural commodities has been economically devastating. If the Danish auto fleet, along with the demand for oil, continues to grow, it could so weaken the economy that a decline in living standards might be inevitable. To avoid this unhappy possibility, Denmark has adopted a number of policies to discourage private automobile ownership, including a high tax on gasoline and stiff parking fees. In addition, the Danish government has launched a campaign to educate people on the national economic dangers of continuing to rely heavily on private cars.

The 1973 oil price increase to \$12 per barrel markedly slowed the production of petroleum and automobiles.

As public understanding rises, auto ownership has become socially less desirable, leading to a decline in the automobile fleet, the first national decline on record. Since 1979, when the Danish automobile fleet totaled 1.42 million, it has fallen to 1.36 million, a drop of some 3 percent.

While discouraging automobile ownership, the Danish government has stepped up investment in public transport, with bus registrations increasing by over one-third between 1973 and 1981. The goal has been to provide speedy, convenient transportation that is cheaper than that provided by automobiles, thus reducing the number of new cars purchased below that of old cars retired.

Sweden also has acted vigorously to discourage growth in automobile ownership. After increasing steadily from mid-century until 1976, growth in the Swedish auto fleet has stopped, remaining essentially static through 1981. It seems likely that over time the forces that halted the growth of the automobile fleet will intensify and lead to a gradual decline.

At the other end of the income range, Peru graphically demonstrates the changes that can occur in the outlook for the automobile in the Third World. Over a decade ago, Peru signed a pact with other Andean countries to produce automobiles, with each country producing certain basic components and final assembly being done domestically. In Peru, which had been manufacturing an average of 17,000 cars per year in the late 1960s, this program led to an increase to over 34,000 by 1976.

At this point, several economic problems brought the growth in production to a halt. The collapse of the country's anchovy fishery sharply reduced the foreign exchange available to import oil. Shortly thereafter the International Monetary Fund required a severe restriction in consumer credit as a condition for additional loans. In 1979 the gasoline price was doubled. Real incomes in Peru were not increasing during this period. Indeed, in some years economic growth failed to keep pace with population growth. Between 1976 and 1978, automobile production fell to just over 11,000 vehicles. By 1981 it had recovered somewhat, to over 20,000 vehicles, but the future of the industry is nonetheless in question.

Whether automobile production in Peru will ever be significant is open to question on many grounds. The country might fare better if it abandoned the automobile-centered industrial development model and shifted its resources into such sectors as agriculture, renewable energy industries and education—activities that would benefit more of the population.

It is quite possible that at the end of the century a number of countries will have even fewer automobiles than they do today. Others may join China and ban the private automobile except in special situations. Although some countries, principally oil exporters, may seek to expand their fleets rapidly, others may have second thoughts about investing heavily in a technology that depends on a nonrenewable resource. Accordingly, they may shift their emphasis toward the development of rail- and bus-centered transportation systems. Such a move would also facilitate more efficient land use, itself an issue of widening concern.

Already many forward-looking national governments are following the lead of Denmark and Sweden in devising policies to discourage auto-centered transport systems. In several European countries, the tax on gasoline exceeds the value of the fuel itself. Other countries, where the price of gasoline is set by government either because of a state oil monopoly (Mexico) or public sector dominance (the Soviet Union), have raised the price of gasoline to discourage car purchases. A number of Third World countries that import automobiles, such as Kenya, are resorting to a stiff import duty, which sometimes exceeds the market value of the vehicle. The International Monetary Fund, in its attempt to promote international economic stability, is also urging higher taxes on gasoline as a way to supplement market forces that promote reduced dependence on imported oil.

Each country must decide what place the automobile will occupy in its transportation system in the post-petroleum age, since no two face exactly the same set of constraints. In some the affluence needed to become a nation of auto owners may never materialize. Others may lack the foreign exchange earnings to import oil to fuel a fleet of cars. Still others may abandon private motor vehicles for reasons of social equity. Collectively, these pressures suggest that the time has come for governments everywhere to reassess the automobile's future. □

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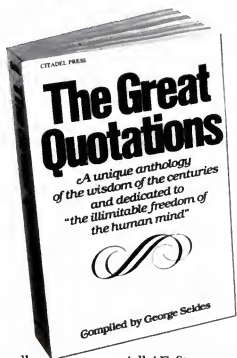
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It is important to understand the motives of Soviet arms transfers to the Third World; they may not threaten U.S. interests as much as the Reagan Administration believes.

Soviet arms transfers to the Third World

by Michael T. Klare

WHEN PENTAGON OFFICIALS catalogue the Soviet military threat to America's global security interests, they usually start with nuclear missiles or the massive armored formations in Eastern Europe. But they almost always conclude with Soviet arms transfers to the Third World.

Noting that such exports are now running at the rate of many billions of dollars per year, Defense Secretary Caspar Weinberger has charged: "These sales form the basis for Soviet penetration of a number of Third World nations, providing Moscow access to nations and regions where it previously had little or no influence." Administration officials have elaborated on this theme, portraying arms sales as a critical factor in the global competition between the United States and the Soviet Union.

This view has exerted a growing and significant impact on U.S. foreign and military policy. Claiming that large-scale transfers of modern Soviet weaponry to radical Third World regimes have imperiled the security of pro-Western nations, President Reagan in 1981 lifted the restraints on U.S. arms exports, imposed by President Carter in 1979. In announcing this action, then Undersecretary of State for Security Assistance James L. Buckley affirmed that the Administration viewed increased arms transfers as "an essential component of our total effort to restore effective deterrence to aggression."²

On this basis, Reagan approved \$31.2 billion worth of arms transfers in fiscal 1982. This was more than twice the amount approved by Carter during his last year in office, and nearly double the previous U.S. record of \$16 billion in fiscal 1975. Moreover, the Soviet arms buildup in such countries as Libya, Ethiopia, Syria, Cuba, Grenada and Nicaragua has been cited by the Reagan Administration as partial justification for an expanded U.S. military presence in the Mediterranean, the Persian Gulf and the Caribbean.

But while most experts agree that Soviet arms transfers pose a growing threat to certain U.S. interests, there is considerable controversy over the degree of that threat and the best way to counter it. Thus many analysts believe that

Soviet arms transfers have *not* proven to be a particularly effective instrument of Soviet policy.

"What nation has been brought permanently into the Soviet orbit because it could buy Soviet MiGs?" former Assistant Secretary of State Hodding Carter III asked in 1981. "Egypt? Peru? Iraq? Who? The landscape of several dozen nations is cluttered with Soviet military hardware, to no discernible lasting Soviet benefit." Arguing that an inflated Soviet arms threat is often used to justify unsound or excessive U.S. transfers, Carter suggested that long-term U.S. security interests would be better served by negotiating multilateral restraints on conventional arms transfers.³

Debate over the severity of the Soviet arms export "threat" has been exacerbated by debates over the relative standing of the two superpowers in the global arms marketplace. Depending on what dollar values are assigned to Soviet exports and what items are tallied, statistics on the arms trade can and do show both the United States and the Soviet Union in first place.

Thus a 1982 State Department study showed the Soviet Union leading in military sales to the Third World with 1974-1981 sales of \$59.2 billion, compared to \$39.0 billion for the United States. But the Congressional Research Service, using somewhat different criteria, put the United States in the lead, with \$68.3 billion in sales for 1974-1981, compared to \$59 billion for the Soviets.⁴ Such studies have been used by analysts to support competing views of the Soviet arms transfer threat.

Differing perceptions of this "threat" can, in turn, lead to very different policy prescriptions. A more pessimistic assessment of the threat can result in higher levels of U.S. arms exports and an increased U.S. military presence in volatile areas. A more optimistic view would support lower levels of exports and possibly a smaller presence abroad. Given the destabilizing effect of military sales on regional arms rivalries, plus the risk that military "presence" can evolve into military involvement—as occurred in Grenada—these are very significant differences indeed. It is important, therefore, to look closely at Soviet arms transfers and to gauge their effectiveness.

ACCORDING TO THE Congressional Research Service, Soviet arms transfer agreements with Third World countries rose from an average of \$5.4 billion in 1974-1976 to \$10.1 billion in 1979-1981, an increase of 87 percent. At the same time, the value of *deliveries* of Soviet arms rose by 184 percent from \$2.8 billion annually in 1974-1976 to \$7.9 billion in 1979-1981. All told, the Soviets sold \$59.2



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Table 1. Soviet and U.S. arms transfer agreements with Third World nations, 1972–1981
(current U.S. dollars in millions)

Year	Soviet Union	United States		Total
		Weapons	Construction and Services	
1972	2,350	3,710	1,094	4,804
1973	3,230	5,390	2,530	7,920
1974	5,970	7,700	1,830	9,530
1975	3,670	4,420	6,080	10,500
1976	6,610	5,420	7,020	12,440
1977	9,750	3,720	2,700	6,420
1978	2,920	4,520	2,950	7,470
1979	8,880	4,910	3,990	8,900
1980	14,770	5,040	5,440	10,480
1981	6,630	3,310	1,640	9,950
1972–1981	64,870	48,140	35,274	83,414

Source: U.S. Department of State, *Conventional Arms Transfers in the Third World, 1972–1981* (Washington, D.C., 1982).

billion worth of arms to Third World countries between 1974 and 1981, and delivered \$43.4 billion worth. (All figures are in current U.S. dollars; see Table 1.)

Soviet military transfers generally contain larger quantities of basic hardware—tanks, aircraft, artillery, missiles and so forth—than do U.S. transfers, which place greater emphasis on training, construction, and other non-weapons items. Thus, if military services and construction work are excluded from the sales tally, Soviet military exports tend to exceed those of the United States. According to the State Department, *total* Soviet military sales to Third World countries for 1972–1981 amounted to \$64.9 billion, while U.S. sales of *weapons alone* totalled only \$48.1 billion.

If, however, the monetary value of services and construction work is added, the U.S. figure jumps to \$83.4 billion.⁵ Moreover, because Soviet weaponry is generally less sophisticated than comparable U.S. equipment sold abroad, Soviet transfers are likely to incorporate larger quantities of hardware than are U.S. sales of the same dollar value. As a result, comparisons of transfers *by item* tend to show much larger Soviet tallies than the dollar comparisons alone would suggest (see Table 2). Yet this does not necessarily mean that larger Soviet deliveries provided that much more *combat power*. As the 1982 fighting in Lebanon demonstrated, U.S. equipment supplied to Israel significantly outperformed Soviet equipment supplied to Syria.

Like the United States, the Soviet Union exports arms and military equipment to a large number of Third World countries. According to the U.S. Arms Control and Disarmament Agency, the Soviets transferred at least some arms to 42 Third World nations between 1975 and 1979, compared to 51 for the United States. The Agency's figures on the monetary value of arms transfers for 1975–1979 show that the Soviet Union is the dominant supplier to Africa (\$9.9 billion in sales) and South Asia (\$2.3 billion), while the United States is dominant in the Middle East (\$13.7 billion) and East Asia (\$5.4 billion). The major West Euro-

pean suppliers—France, West Germany, Britain and Italy—are dominant in Latin America (\$2.2 billion).

The figures also indicate that the Soviet Union, like the United States, is apt to concentrate its export activity in a number of key client nations, which together account for a very large proportion of total transfers. The top seven recipients of Soviet arms—Algeria, Cuba, Ethiopia, India, Iraq, Libya and Syria—together accounted for about 70 percent of all Soviet transfers in 1975–1979 (Table 3).⁶

In general, Soviet sales to Third World countries incorporate less sophisticated gear than comparable U.S. transfers. There is no Soviet counterpart, for instance, of the U.S. AWACS radar surveillance planes sold to Saudi Arabia. But in recent years Moscow has tended to supply more sophisticated hardware to its cash-paying customers. Thus Vietnam and Cuba continue to get relatively older systems, while Libya, Iraq and Syria are receiving late-model MiGs, SAMs and tanks.

Soviet exports of high-tech weaponry, like their U.S. equivalents, are often accompanied by sales of technical military services—training, maintenance, and so forth. But while most U.S. military technicians employed abroad are civilians, Soviet advisors are almost always regular officers drawn from the Soviet and East European military establishments.

According to the U.S. State Department, some 16,280 Soviet and 1,925 East European military advisors and technicians were present in Third World countries in 1981. The largest contingents—over 1,000 technicians each—were in Algeria, Afghanistan, Angola, Ethiopia, Iraq, Libya, South Yemen and Syria.⁷ These advisors normally perform the same functions as their civilian U.S. counterparts: assistance in the delivery, assembly and operation of military equipment; training in the operation and upkeep of such equipment; and advisory support for military headquarters and organizations.

All of these figures indicate that the Soviet Union is providing ever larger quantities of increasingly sophisticated

Table 2. Deliveries of major weapons to the Third World by the United States and the Soviet Union, 1974-1981

<i>Weapons type</i>	<i>United States</i>	<i>Soviet Union</i>
Tanks and self-propelled guns	6,256	10,230
Artillery	5,906	14,375
APC and armored cars	12,511	12,055
Major surface combatants	84	40
Minor surface combatants	117	168
Submarines	14	15
Supersonic combat aircraft	1,322	3,075
Subsonic combat aircraft	659	420
Other aircraft	1,268	470
Helicopters	635	1,150
Guided missile boats	0	74
Surface-to-air missiles (SAMs)	7,445	20,010

Source: Congressional Research Service, U.S. Library of Congress, *Trends in Conventional Arms Transfers to the Third World by Major Supplier, 1974-1981* (Washington, D.C., 1982).

weaponry to a large and growing pool of Third World countries. But they do not tell us *why* Moscow is doing so. It is customary to attribute this activity to a few basic motives, mostly having to do with the quest for political power. A closer look, however, suggests a wider range of motives, which we should identify for only then can we gauge the effectiveness of the Soviet arms export program.

SIX FACTORS appear to be significant in motivating Soviet arms exports to the Third World.⁸

- *Political presence.* In many cases, Soviet ties with the Third World were first established through the initiation of arms arrangements—particularly in the 1950s and 1960s, when U.S.-sponsored collective security systems like SEATO (Southeast Asia Treaty Organization) and CENTO (Central Treaty Organization) effectively blocked Moscow's access to Third World nations.

As Roger Pajak of the Treasury Department's national security staff has written, arms aid "has served as the primary Soviet vehicle for establishing a presence in regions important to Western interests, often providing the USSR with political entrée."⁹ But if Moscow's reliance on arms transfers to gain entry can be ascribed to political calculation, it also reflects a lack of viable alternatives. "Moscow has comparatively little to offer in the way of trade, investment, and the transfer of technology," Andrew Pierre of the Council on Foreign Relations has noted, while arms can "be provided cheaply and abundantly."¹⁰

- *Superpower competition.* The Soviet Union has followed Washington's example by using arms transfers to establish military alliances with key Third World nations and to woo other countries away from its rival. When the West has refused to supply nationalistic Third World regimes with modern arms, Moscow has been quick to offer the desired hardware.

But such competition is a two-way street. Just as Washington has been forced to respond to Soviet military initiatives by enhancing the defensive capabilities of pro-Western regimes, so has Moscow been forced to respond to U.S. initiatives by strengthening the defense of pro-Soviet regimes. Indeed, a large share of Soviet arms transfers flows to nations such as Cuba, Vietnam and North Korea which are threatened by U.S.-backed regimes or by the United States itself.

- *Sino-Soviet competition.* Some Soviet arms-export programs have been motivated by competition with the East—specifically with China. Since the 1960 Sino-Soviet split Peking has vied with Moscow for the loyalty of national liberation movements and radical Third World regimes, and arms transfers have played a key role in the contest. This competition has been particularly intense in sub-Saharan Africa and Southeast Asia, where both China and the Soviet Union have long provided arms to liberation organizations and to the anti-Western regimes they have spawned.

- *Acquisition of basing facilities.* As Moscow's activities and commitments in the Third World have expanded, Soviet leaders have sought to establish military basing facilities in strategic areas. Lacking the long-standing basing rights enjoyed by the United States at such locales as Cuba's Guantanamo Bay, the Panama Canal Zone and Subic Bay in the Philippines, Moscow has often used arms transfers as "payment" for access to the military facilities of its clients.

Such access was a major motive for the large-scale Soviet transfers to Egypt and Somalia, both of which granted Moscow access to their port facilities. And it continues to motivate Soviet transfers to Libya and South Yemen, both of which have been used as staging areas for Soviet transport and reconnaissance aircraft.

- *Political insurance.* Although Western analysts tend to

Table 3. Major Third World recipients of Soviet arms, 1975-1979 (current U.S. dollars in millions)

<i>Country:</i>	<i>Value of transfers</i>	<i>Percent of total Soviet transfers to the Third World</i>
Libya	5,000	18.1
Iraq	4,900	17.7
Syria	3,600	13.0
India	1,800	6.5
Algeria	1,500	5.4
Ethiopia	1,500	5.4
Vietnam	1,300	4.7
Cuba	875	3.2
Iran	650	2.3
Peru	650	2.3
Other Third World nations	5,925	21.4
Total, all Third World nations	27,700	100

Source: U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers, 1970-1979* (Washington, D.C., 1982).

view Soviet arms programs in the Third World as a consistent gain for Soviet policies, the leadership in Moscow knows better. Such programs have often soured, as in the case of Egypt and Somalia; or they have been used for adventurist purposes, as in the 1980 Iraqi invasion of Iran. Excursions of this kind not only undermine basic Soviet objectives but risk Soviet involvement in unwanted regional conflicts. Given this record, Moscow—no less than Washington—has often felt compelled to expand an arms-supply relationship it would have preferred to restrain in order to maintain some leverage over client behavior. This appears to be especially true of Syria, which continues to receive quantities of Soviet arms despite considerable Soviet dissatisfaction with Syrian involvement in Lebanon.

• *Source of hard currency.* Soviet leaders are not unmindful of the economic benefits of arms sales. Indeed, since 1970 they have placed increasing emphasis on cash transactions while cutting back on grant aid programs. This shift evidently reflects Moscow's concern over its growing trade imbalance with the Third World (partly caused by large-scale Soviet purchases of grain and other foodstuffs), and its need for hard currency with which to purchase Western technology. According to the CIA, by 1979 arms transfers offset large annual deficits in Soviet nonmilitary trade with Third World states and significantly supplemented Moscow's hard currency earnings.¹¹

These six factors appear to be the principal motives underlying Soviet arms transfers in the Third World. While any one or two may prevail in a given case, it is the *clustering* of motives—each reinforcing the other—that drives the Soviet export program. So long as this clustering persists, we can expect relatively high levels of Soviet arms transfers to the Third World.

Yet it does not necessarily follow that there will be a steadily expanding market for Soviet arms. No matter how much Moscow may want to increase its sales, it will not be successful if present clients refuse to increase their level of spending and new customers cannot be found.

While Moscow was highly successful in boosting arms exports in the late 1970s, there are some signs that this drive has run out of steam because of slackened demand. Soviet arms transfers to the Third World dropped from \$14 billion in 1980 to \$6 billion in 1981, its lowest level in years.¹² The reasons are threefold: One is that a number of Moscow's major clients, including Libya and Algeria, made substantial purchases of high-tech gear in the late 1970s and are now refraining from further orders until this new equipment is absorbed. Another is that several other clients, among them Iraq and India, have demonstrated a strong desire to diversify their arms imports in order to reduce their reliance on any one supplier. And finally, the Soviets have not succeeded in attracting any new customers since the invasion of Afghanistan; and the poor performance of its equipment in the 1982 Lebanon conflict is likely further to discourage potential buyers.

SOVIET LEADERS, in sum, are motivated by a wide

range of political, military and economic considerations when approving arms transfers to the Third World. Like their U.S. counterparts, moreover, they presumably believe that such transfers are useful in achieving stated policy objectives. This does not mean, however, that Soviet arms transfers actually *deliver* all of the benefits ascribed to them. In fact, Moscow has discovered that such exports can be an extremely unreliable instrument of policy, often producing results that are wholly inconsistent with fundamental Soviet objectives. Indeed, the balance sheet on Soviet arms transfers carries significant losses as well as gains.

In terms of gaining political *access*, there is no question that the Soviet arms transfer program has been highly successful. The Soviet Union now supplies arms to about 40 Third World nations, many of which cooperate with Moscow in other spheres. Arms transfers have also provided other benefits; some Third World clients allow the Soviets to station reconnaissance and transport aircraft on their territory, and some have become active political partners. And, as we have seen, arms sales have become a major source of hard currency.

These are respectable gains, and explain the continuing Soviet involvement in military exports. But however impressive, they cannot obscure one fundamental reality: Soviet arms transfers to the Third World have not resulted in *lasting political influence*—that is, in an abiding capacity to alter or affect political-military decision-making by the leaders of recipient nations. Indeed, the record shows that the Soviets have been repeatedly frustrated in their attempts to use arms transfers to gain influence abroad, as their experience in Egypt and Iraq clearly demonstrates.

President Gamal Abdel Nasser was the first Third World leader to request Soviet military assistance, and for 20 years Egypt was the leading Third World recipient of Soviet arms. At the peak of Soviet influence in Egypt, from 1967 to 1971, Moscow had some 20,000 military advisors in that country and enjoyed nearly unlimited access to the naval facilities of Alexandria. But Moscow declined to supply Egypt with its most advanced offensive arms and counseled restraint in the struggle with Israel. Cairo, for its part, persistently objected to the inadequate quality of Soviet deliveries and complained of the "arrogant" behavior of Soviet military advisors.

These strains grew more intense after Nasser was replaced by Anwar el-Sadat, and in July 1972 Sadat cancelled Soviet port privileges and expelled most of the advisors. Fresh Soviet equipment was requested (and paid for in cash) during the October 1973 war with Israel, but Moscow never regained its privileged position in Egypt. Finally, in 1974, Sadat expelled the remaining Soviet advisors and repudiated Egypt's \$5 billion arms debt. For Moscow, the public loss of its oldest and most important client in the Middle East represented a humiliating foreign policy defeat. Other Arab nations have since become major Soviet clients, but none has come close to Egypt in terms of political or strategic significance.

Meanwhile, Iraq remains a major Mideast recipient of

Soviet arms. Yet here, too, there are considerable strains in the relationship and evidence of a determined Iraqi effort to reduce this military dependency. Between 1970 and 1979 Iraq received some \$4.9 billion worth of Soviet arms, more than any other Third World nation except Libya. This largesse has not, however, deterred President Saddam Hussein from seeking arms in the West (a \$1.6 billion agreement for 60 Mirage F-1s was concluded with France in 1977), nor from opposing Moscow on other key issues. Thus, Iraq was notably forthright in its condemnation of the Soviet invasion of Afghanistan.

More significantly, Soviet arms aid has not given Moscow any measure of political influence in Baghdad, as reflected in Hussein's 1980 decision, against Soviet wishes, to invade Iran. Moscow's obvious discontent over the invasion has further strained relations with Iraq, leading many analysts to predict an open break once the Iran-Iraq conflict is settled.

These two cases are fairly representative of the Soviet experience in using arms as instruments of influence and entree in the Third World. Admittedly, there are some brighter spots—Cuba, Vietnam and South Yemen remain close allies—but there are also other failures—Sudan, Guinea, Somalia and Indonesia among them.

There are also many problem areas. Algeria, for instance,

appears determined to improve its ties with the West, and both Angola and Mozambique have resisted a formal military relationship with the Soviet Union involving bases and the like. Syria, the number three recipient of Soviet arms after Libya and Iraq, has repeatedly clashed with Moscow on fundamental issues—for example, over the 1976 Syrian occupation of Lebanon, which triggered a temporary suspension in Soviet arms deliveries. Even today, Syria appears determined to maintain its distance from Moscow despite a continuing need for Soviet arms.¹³

THIS BRIEF OVERVIEW of Soviet arms programs in the Third World suggests that the record is strewn with more failures than successes.¹⁴ Nor is there any indication that the Soviet arms effort will be any more successful in the future. For the degree of Soviet (or, for that matter, U.S.) influence over a client tends to diminish as the sophistication and quantities of the arms provided to that client increase. As Barry Blechman, Janne Nolan and Alan Platt have observed: "The arms suppliers themselves undermine their ability to dominate certain Third World conflicts by this very effort to secure political advantage by the transfer of increasingly sophisticated arms."¹⁵ Thus it was the big Soviet buildup in Egypt following the 1967 war with Israel that enabled Cairo to launch the 1973 war, which

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ended with Moscow's virtual exclusion from the Mideast peace process. And it was Soviet generosity in Iraq that helped induce President Saddam Hussein to invade Iran.

No doubt it is for this very reason that the Soviets hedge their bets by supplying less capable equipment than their clients want. Usually, the aircraft and tanks supplied to Third World states embody less advanced avionics and fire-control systems than those delivered to Soviet and Warsaw Pact forces, and in some cases they withhold certain types of equipment altogether. Thus, the Syrians have often complained that the weapons they receive from Moscow are no match for those supplied to Israel by the United States.

These charges are generally borne out by an examination of the arms in question. As Cynthia Roberts of Columbia University puts it: "No Soviet aircraft in the region meets the high performance standards of the U.S.-supplied F-15 or F-16, much less their complement of air-to-air missiles. . . . and even more striking, is the complete absence of real-time early-warning or electronic warfare aircraft" comparable to the U.S. E-2C and AWACS sold to Israel, Egypt and Saudi Arabia.¹⁶

Such practices have not, however, enabled the Soviet Union to escape the dilemmas posed by its massive arms transfer programs. On the one hand, Soviet leaders evidently feel compelled to maintain costly programs of dubious benefit rather than face the complete loss of a hard-won client relationship. On the other, they fear that continued support for unpredictable and uncontrollable recipients could result in direct Soviet involvement in risky military ventures abroad.

As Roger Pajak suggests, recent Mideast events have taught Moscow that "a special relationship with arms recipients can lead to risks of unwarranted military involvement and possible military confrontation with the United States."¹⁷ This appears particularly true in Syria, where Soviet efforts to placate President Assad's desire for sophisticated air-defense missiles have placed Soviet military personnel in dangerous proximity to Israel and the U.S. naval task force off the coast of Lebanon.

This is a sobering assessment, one which must give Soviet leaders pause when confronted with major requests from unpredictable clients. So long as Moscow feels compelled to compete with Washington for influence and presence in the Third World, we can expect a continuing Soviet effort to boost its military transfers to strategically-placed clients. But given the problematic outcome of Soviet military exports, we can also conclude that Soviet leaders have a real interest in curbing these exports.

Indeed, analyses of the U.S.-Soviet Conventional Arms Transfers talks of 1977-1978 indicate that Moscow was prepared to make significant concessions in return for U.S. restraint in areas which had the greatest potential for a superpower confrontation, especially the Middle East. According to the chief U.S. negotiator, Leslie Gelb, the Soviets were motivated to reach such agreements because "they have not always achieved what they hoped for politically through arms transfers and [because] their arms have been used in

ways that were not intended."¹⁸ Unfortunately, the international climate did not permit continuation of the negotiations beyond the preliminary stage. But they did last long enough to demonstrate that Moscow was sufficiently dissatisfied with the results of its arms transfers program to consider a new set of arms control agreements with the United States. Nothing has occurred since to contravene this assessment, and we can assume that the Soviets would again consider such proposals if broached in a responsible manner. □

1. U.S. Department of Defense, *Soviet Military Power* (Washington, D.C.: 1981), p. 87.
2. James L. Buckley, address before Aerospace Industries Association, Williamsburg, Virginia, May 21, 1981 (U.S. Department of State transcript).
3. Hodding Carter III, "The Boom in Arms Sales," *Wall Street Journal* (July 23, 1981).
4. U.S. Department of State, *Conventional Arms Transfers in the Third World, 1972-81* (Washington, D.C.: 1982); U.S. Library of Congress, Congressional Research Service, *Trends in Conventional Arms Transfers to the Third World by Major Suppliers, 1974-81* (Washington, D.C.: 1982).
5. *Conventional Arms Transfers 1972-81*, p. 11.
6. U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers, 1970-1979* (Washington, D.C.: 1982), pp. 127-30.
7. U.S. Department of State, *Soviet and East European Aid to the Third World, 1981* (Washington, D.C.: 1983), pp. 2, 4.
8. See also Andrew Pierre, *The Global Politics of Arms Sales* (Princeton, New Jersey: Princeton University Press, 1982), pp. 73-82; Rajan Menon, "The Soviet Union, the Arms Trade, and the Third World," *Soviet Studies* (July 1982), pp. 377-96; David Holloway, *The Soviet Union and the Arms Race* (New Haven, Connecticut: Yale University Press, 1983), pp. 123-266. For an assessment of U.S. motives, see Michael T. Klare, "The Political Economy of Arms Sales," *Bulletin* (Nov. 1976), pp. 11-17.
9. Roger F. Pajak, "Soviet Arms Transfers as an Instrument of Influence," *Survival* (July-Aug. 1981), p. 169.
10. Andrew Pierre, "Arms Sales: The New Diplomacy," *Foreign Affairs* (Winter 1981-82), p. 271.
11. U.S. Central Intelligence Agency, *Communist Aid Activities in Non-Communist Less Developed Countries, 1978* (Washington, D.C.: 1979), p. 3.
12. *Soviet and East European Aid*, p. 1.
13. For other assessments of the arms transfer "balance sheet," see: Pierre, *Global Politics*, pp. 73-82, 138-42; Menon, "The Soviet Union, the Arms Trade, and the Third World," pp. 388-94; "Soviet Weapons Exports," *Defense Monitor* (Jan. 1979), pp. 1-8; Pajak, "Soviet Military Aid to Iraq and Syria," *Strategic Review* (Winter 1976), pp. 165-73.
14. See also Pierre, "Arms Sales: The New Diplomacy," p. 273.
15. Barry M. Blechman, Janne E. Nolan and Alan Platt, "Pushing Arms," *Foreign Policy* (Spring 1982), p. 148.
16. Cynthia A. Roberts, "Soviet Arms-Transfer Policy and the Decision to Upgrade Syrian Air Defenses," *Survival* (July-Aug. 1983), p. 160.
17. Pajak, "Soviet Arms Transfers," p. 170.
18. Quoted in "Soviet Weapons Exports," p. 8.

Militarization of the Third World

by James Cracraft

THE INCREASE, in recent years, in Soviet arms transfers to the Third World has been used by the Reagan Administration to justify a corresponding increase in U.S. transfers, as Michael Klare points out. He also shows that

the volume of Soviet military exports to Third World countries now appears to be declining. He concludes that the time is ripe for a revival of the U.S.-Soviet Conventional Arms Transfers (CAT) talks of 1977-1978, which aimed at securing multinational restraints in this area.

Elsewhere, Klare argues that the export of conventional arms technology poses a growing and still graver threat to international security.¹ To summarize: since the 1950s, as part of its global struggle against communism, the United States has sought to enhance the military-industrial capacities of its closest allies by means of licensing or co-production agreements. These agreements provide that the U.S. government (or a U.S. firm) supply another government (or a foreign firm) either with the technology to produce a given weapon or component for its own use or with such expertise as is necessary for the joint production of a given item for the use of both parties.

Long the most active supplier of conventional arms-making technology to other countries—transfers involving everything from blueprints to complete factories—the United States in 1982 was party to 21 major military co-production programs in Europe, Canada and Japan, in addition to numerous lesser programs and hundreds of licensing agreements. At the same time, such U.S. firms as Northrup, General Dynamics, Chrysler and Westinghouse were co-producing advanced fighter aircraft, helicopters, rockets, tank components and radars in Taiwan, South Korea, Turkey, Israel and Egypt. And further licensing or co-production agreements were pending or in place with Pakistan, Greece, Saudi Arabia, Singapore and Thailand.

Unlike the United States and other Western countries the Soviet Union has only occasionally exported conventional arms-making technology to Third World states. Only India, North Korea and, until 1960, China have proved exceptions in this respect to the general Soviet mistrust of any attempt by friends or clients to gain independence in the military sector. Similarly, while not more than 100,000 men from the Third World, excluding China, have received military training in the Soviet Union since 1949, the U.S. armed forces have trained at least 370,000 such men over the same period—a disparity that appears to be due, in large part, to a fear of ideological infiltration among Soviet arms customers.²

In short, if the volume of Soviet conventional arms transfers to the Third World is currently as high as, or even higher than, that of the United States, it remains a fact—however explained—that Soviet military training programs and technology exports have been and continue to be much less significant with regard to the Third World than those of the United States.

Most studies of military transfers from the developed to the developing world emphasize the risks and benefits incurred to the economy and security of the exporting countries. It is also generally agreed that in seeking advanced conventional arms and arms-making technology Third World countries are motivated by nationalism or national

security considerations and by a quest for technological "spinoffs" that will benefit the national economy as a whole. There are also the twin hopes of reducing hard-currency outlays for arms and of promoting their own exports of low-cost, relatively unsophisticated arms to still less developed countries. Seldom do we read in any detail of the severe costs of this trade, whether in economic or in political terms, to the Third World itself.

Yet sales of military technology to Third World countries often help to expedite the establishment of modern armaments industries there at the expense of other, more crucial development programs. The total annual dollar value of arms imports by developing countries increased some 20 times between 1961 and 1981, which contributed significantly to the growing and now often huge foreign debt of those same states. Among 20 countries with the largest foreign debt in 1983, arms imports between 1976 and 1980 accounted for 20 percent of the increase in debt; in four of the 20, the value of arms imports was equal to 40 percent or more of the rise in debt during those years. Still more ominous, of 116 countries labeled "developing" in 1983, 56 were under military regimes characterized by frequent official use of violence against the public. In relation to their populations, these 56 countries had more men under arms than other Third World states and *double the arms imports*.³

Meanwhile, foreign economic aid to developing countries grew at a snail's pace—especially by comparison with the military expenditures of the developed countries, which rose by over \$400 billion between 1960 and 1982, while the rise in aid came to only \$25 billion. U.S. military expenditures in 1980 totalled \$144 billion; development aid, \$7 billion.⁴ The monetary value of arms supplies to the Third World by the Soviet Union in 1983 is estimated to have been at least six times that of Soviet economic aid.⁵

Michael Klare's call for a revival of the U.S.-Soviet Conventional Arms Transfer talks certainly is justified. But more, the complicity not only of governments but of banks in financing this dreadful trade must be brought into the open. To finance or refinance the militarization of the Third World is in nobody's best interest. Developments over the past five years in the Middle East alone, where military expenditure has increased by more than 35 percent,⁶ have made this abundantly clear. □

James Cracraft is senior editor of the Bulletin.

1. Michael T. Klare, "The Unnoticed Arms Trade: Exports of Conventional Arms-Making Technology," *International Security* (Fall 1983), pp. 68-90.

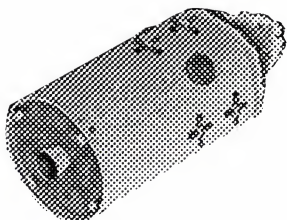
2. Joachim Krause, "Soviet Military Aid to the Third World," *Aussen Politik: German Foreign Affairs Review*, no. 4 (1983) pp. 392-403.

3. Figures from Ruth Leger Sivard, *World Military and Social Expenditures 1983* (Washington, D.C.: World Priorities), pp. 11, 24.

4. *Ibid.*, pp. 23, 33.

5. Krause, "Soviet Military Aid," p. 403.

6. *The Military Balance, 1983-1984* (London: International Institute for Strategic Studies, 1983), p. 150.



Space Weapons

History and current debate

Richard Garwin and John Pike

Effect on strategic stability

Yevgeny P. Velikov

President Reagan's proposal to create a comprehensive space-based anti-missile defense system has been vigorously challenged by scientists on technical as well as strategic, political and even moral grounds. Richard L. Garwin has been prominent among the challengers. In February 1983 he and Carl Sagan authored a petition urging the United States, the Soviet Union and "other space-faring nations" to agree to ban weapons of any kind from space and in particular "to prohibit damage to or destruction of satellites of any nation"—a petition signed by dozens of other leading U.S. scientists (Bulletin, November 1983).

In the following article Garwin and John Pike provide a comprehensive argument against the Reagan proposal, concluding with an urgent call for negotiations. Their article is followed by one from Academician Yevgeny P. Velikhov of the Soviet Union. While agreeing in essence with the Garwin-Pike analysis, Velikhov also calls for a diversion of funds from weapons research into such joint U.S.-Soviet

projects as space exploration.

Several prominent scientific organizations share the Bulletin's concern with the militarization of space and either have published or are preparing studies of the military uses of space. A joint project of the Brookings Institution and the Massachusetts Institute of Technology has recently resulted in a book, *Ballistic Missile Defense*. In late March the Union of Concerned Scientists released the 106-page report of a study panel, *Space-Based Missile Defense*. The Federation of American Scientists has now made available a book-length study, *Anti-Satellite Weapons: Prospects and Implications*. The American Physical Society has established a task force to study and evaluate directed energy weapons. And finally, the American Academy of Arts and Sciences has begun a study of weapons in space, which is to be ready for publication by the end of this year. The Bulletin will continue to report on problems and developments in this area.

History and current debate

by Richard L. Garwin and John Pike

THE QUESTION of space weaponry has become more urgent and much more widely discussed since one of the authors last wrote about the subject in these pages.¹ Two types of concerns are evident—those connected with anti-satellite capabilities and activities (ASAT) and those connected with global defense against ballistic missiles. This article will survey these two topics and their important, but limited interaction. Our conclusion, based upon many years of involvement with strategic offensive weapons, strategic defenses and military space systems, is that an effective ban on anti-satellite activities and capabilities and on weapons in space would best serve the national security interests of the United States. Furthermore, an effective ban is feasible and can be negotiated quickly.

Overview: history and present status

For the past 25 years, space weapons have remained largely in the realm of speculation. With President Reagan's Star Wars speech of March 23, 1983, their discussion assumed a certain immediacy, but underlying developments are equally to blame. Space weapons include systems that either are based in space or are intended for use against targets in space, such as satellites. In the past, the poor perfor-

mance of such systems made it rather difficult to identify useful military missions for them. Now present and prospective improvements in sensor and computer technology, as well as in kill-mechanisms such as directed energy systems, have encouraged a reexamination of the case for space weapons.

The technology of space weapons might have changed, but the strategic and political questions concerning them have not. It is important to ask whether any missions for space weapons would result in a net improvement in U.S. national security or in the prospects for peace.

During the 1960s both the United States and the Soviet Union developed anti-satellite systems with marginal capabilities. Because of their limitations, and because of the new-found value of satellites themselves, these systems generally did not attract much interest.

The two early U.S. ASAT systems suffered from several common defects. Deployed in very small numbers, they were capable of rather modest rates of fire, and their limited range meant that they had to wait for an intended target to pass within a few hundred miles of their base before an interception could be attempted. The use of high-yield nuclear warheads furthermore posed the risk of considerable collateral damage to friendly satellites. Neither of their potential missions—defense against Soviet orbital nuclear weapons and deterrence or defeat of Soviet attacks on U.S. reconnaissance satellites—seemed particularly compelling by the early 1970s.

Although the early history of Soviet ASAT efforts remains clouded by official secrecy, their capabilities seem no more than slightly behind those of the United States. A clear indication of Soviet work in this area came in 1968, with the initial test of an orbital ASAT, colloquially known as a "killer satellite," reminiscent of the abandoned U.S. SAINT



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(Satellite Inspection Technique) program. The Soviet ASAT is launched by a modified version of the SS-9 ICBM. The intercept vehicle itself has a mass of 2,300–3,300 kilograms, and 1,000 kilograms of maneuvering fuel would give it a maneuvering velocity change of as much as one kilometer per second. The system has been tested 20 times, using a variety of trajectories that take from 45 minutes to several hours from launch to intercept, reported at a maximum altitude of 2,300 kilometers. Initial tracking of the target is reported to use ground-based radars. An on-board active radar guidance system achieved 10 successes in 14 attempts. Beginning in 1976, a more sophisticated passive system, perhaps using an optical sensor, has been tested six times with no more than one success. Several types of payloads might have been carried on the interceptor.

In 1979, Air Force Chief of Staff Lew Allen characterized the Soviet ASAT as “having a very questionable operational capability.” The variety of anti-satellite components and techniques, as well as the fitful and irregular pace of the tests, suggest that the program is as much an effort to develop a generic military technology as it is to deploy a weapon to counter a specific set of targets. The limited maneuvering capabilities require that it be placed into an orbit that is generally similar in inclination to that of its intended target. Thus the interceptor cannot be launched until the orbital ground track of its target passes to within a few hundred kilometers of the launch facility. This requirement may not be satisfied for several hours, even as long as a day, after a decision has been made to conduct an intercept. The small number of launch pads available for ASAT launches imposes a further operational limitation.

The present Soviet ASAT potentially threatens low-flying U.S. space assets, including photographic reconnaissance satellites and the Transit navigation satellites. However, most important U.S. satellites, such as those used for early warning and communications, are in geosynchronous orbit (GEO) at 36,000 kilometers above the Earth—far beyond the demonstrated range of the Soviet ASAT. The threat to satellites in lower orbits will decline in coming years, as various survivability programs for them are implemented, such as the transfer of the navigation support mission to the Navstar satellites, which orbit at an altitude of 20,000 kilometers.

DURING the 1970s both countries greatly increased their reliance on space to support conventional and strategic forces on Earth. In the absence of restraint these numerous military support satellites could be an incentive to develop new and more capable ASATs in order to reduce enemy military effectiveness, with serious negative implications for both crisis and arms-race stability.

The Soviet resumption of ASAT testing in February 1976, after a pause of over five years, was the proximate impetus for the development of the new U.S. ASAT, initiated in the closing days of the Ford Administration. Major ASAT funding increases had been proposed prior to the resumption of Soviet testing, and the Carter Administration subsequently concurred in this decision as part of a multi-pronged ef-

fort that included programs to enhance the survivability of military satellites and negotiations with the Soviet Union to limit ASATs.

The ASAT configuration chosen for development is the Air-launched Miniature Homing Vehicle (ALMV), delivered by a small two-stage rocket to be carried on an F-15 fighter aircraft. The SRAM (Short-Range Attack Missile) first stage and the ALTAIR-III second stage would be launched from the F-15 guided by a programmed inertial guidance system, to intercept a satellite whose orbital parameters had been determined by ground-based sensors. Weighing about 1,200 kilograms, the F-15 launched rocket would boost a Miniature Homing Vehicle (MHV) which would maneuver to intersect the target satellite's orbit, destroying the target on impact.

The maximum altitude at which the ALMV can attack satellites may be in the range of 2,000 kilometers. Whatever the “reach,” or cross-range capability, of the ASAT, the F-15 can carry it to launch points several thousand kilometers from the home air base. With the use of mid-air refueling and basing at forward facilities such as Diego Garcia or Ascension Island, the ALMV could be used to attack low-altitude satellites at almost any point in their orbit. This system will be capable of attacking a wide range of Soviet military satellites, including all their photographic and electronic intelligence satellites, the Radar Ocean Reconnaissance Satellites (RORSATs), and the *Salyut* space station. Communication and early warning satellites in highly elliptical 12-hour *Molniya* (lightning) orbits can be attacked at the low points in their orbits, which are over the Antarctic Ocean. This would require forward basing of the F-15 at Diego Garcia, Ascension Island or North West Cape, Australia, as well as aerial refueling.

The first flight test of the ALMV booster was on January 21, 1984. The first test of the system against a target in space will come at the end of 1984, and at least ten additional such tests are planned before the system becomes operational in 1987. Over 100 interceptor rockets are scheduled for procurement at a total cost of \$3.6 billion, although this cost is expected to increase. About 50 F-15s will be modified to carry the ASAT, permitting the entire arsenal of interceptors to be fired within a few hours.

To the extent that the United States or the Soviet Union depends or is believed to depend on satellites for strategic deterrent capability, acquisition by either country of an ability to destroy the opponent's early-warning, communication and navigation satellites could provide an incentive to initiate an anti-satellite campaign that would greatly degrade the capabilities of the opponent's military forces. Should *both* countries achieve such a capability, each would have considerable incentive to initiate preemptively such a

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An F-15 plane equipped with anti-satellite weapons (ASAT), currently being tested by the U.S. military.

campaign during a time of acute crisis. Both instances would decrease crisis stability and increase the threat of war. If a strategic defense, especially a perfect or disarming one, depends on satellites, those satellites are at particular risk. The possibility that accidental malfunctions of vulnerable satellites could exacerbate an on-going crisis also cannot be ignored.

Today we are confronted by the third generation of anti-satellite weapons. The early U.S. ASATs, flying short ballistic trajectories to deliver nuclear warheads, were soon followed by the more advanced Soviet ASAT, which orbits a conventional explosive charge that maneuvers to within range of its target. Now the United States has begun testing an even more advanced air-launched system. In the absence of mutual restraint, it can only be a matter of time before both countries field even more capable systems, thus placing arms race stability at risk.

More advanced ASATs may pose increasingly serious challenges to the 1972 ABM Treaty. U.S. (and presumably Soviet) ASATs have incorporated technologies derived from ballistic missile defense systems. In the future, systems that were nominally for anti-satellite purposes could be used to approach ballistic missile defense capabilities that are otherwise prohibited by the ABM Treaty. The more capable ASATs of one side might create such suspicions on the other, raising the specter of a gradual erosion of the Treaty regime under the guise of an ASAT competition.

President Reagan's Star Wars speech, however, has posed a more immediate challenge to the ABM Treaty. Although the Administration has proposed no immediate abandonment of the Treaty, a number of likely development and test programs may raise questions of compliance with the letter of the Treaty. More important, if the doctrinal implications of the President's initiative gain general acceptance in the United States, the demise of the Treaty will soon follow. Under these circumstances, the Soviet Union can hardly be expected to sit back and wait for the United States to choose a convenient time to announce its renunciation.

The strategic and political rationale of the ABM Treaty was developed in an era of technology that both superpowers have now surpassed. But technological innovation does not invalidate that rationale, nor lessen the Treaty's importance. No ABM system in prospect could provide a perfect defense against attack. Such systems are subject to passive and active countermeasures, including direct attack on the defensive system itself, and a ballistic missile defense system which seems promising against the existing strategic offensive force may be defeated at little cost. A ballistic

missile defense system would be much more effective in defending against a small and disorganized retaliation than it would in defeating a massive and well-organized first strike. This disparity would provide incentive for preemption (by either side) that would undermine crisis stability.

Arms-race stability would also suffer, as the most straightforward countermeasures would be a simple proliferation of offensive arms. Since each country would tend to overestimate the effectiveness of the opponent's defensive system, while underestimating the effectiveness of its own defenses, conservative planning would generate ever higher requirements for offensive forces. There is no rational upper limit to this competition, save perhaps the carrying capacity of the country's economy.

These systems would require funding on an unprecedented scale. Various estimates place the cost of two layers of ground-based ABM systems at \$200 billion, and the cost of the space-based component at perhaps \$500 billion. To these costs should be added those of continental air defense and civil defense, which would push the cost of the total strategic defense package to over \$1 trillion.

These estimates, however, do not fully capture the magnitude of the problem, since such defensive systems will have to be maintained, modified and upgraded in response to the changing and inexorably expanding offensive threat. What is really under discussion is the addition of perhaps \$100 billion annually to the defense budget, perhaps as soon as the mid-1990s. Given the negative impact on crisis and arms-race stability of strategic defensive systems, it is difficult to see the justification for expenditures of this magnitude.

Prospects

In most important respects the new U.S. ASAT constitutes an order of magnitude improvement over the existing Soviet ASAT. The flight time from launch to intercept is one-tenth as long. The total number of interceptors will be ten times greater. The Soviet ASAT booster is ten times the size, and 100 times the mass of the U.S. ASAT booster, and the disparity between the sizes of the actual intercept vehicles is even greater.

It is clear, however, that the new U.S. ASAT is not the last word in weapons of this sort. In the absence of negotiated restraint, both the United States and the Soviet Union are likely to develop even more capable anti-satellite weapons, which will share two disturbing characteristics: the ability to attack satellites in high orbits and an increasing resemblance to anti-ballistic missile systems. Both are good reasons for precluding the development of such weapons.

The United States has already studied several advanced ASATs that would use the Miniature Homing Vehicle and more capable boosters. A larger air-launched booster rocket could extend the range of the F-15 system so that it could attack satellites at an altitude of several thousand kilometers. Above this range, the advantage of using air-launching to match the orbital ground track of the target diminishes. Satellites at higher altitudes could be attacked by launching the MHV atop a larger rocket, such as the Minuteman

or the Trident. These systems could be developed in a few years time, at a cost of several billion dollars.

A transfer from low Earth orbit (LEO) to inject into GEO with minimum additional energy requires a velocity increase of 3.6 kilometers per second—about a factor three increase in launch weight (or a factor three reduction in available payload). This does not include the plane change required if one insists on *co-orbital* trajectory; that amounts to almost another factor two if one starts with an orbital inclination of 60 degrees corresponding to Soviet launch latitudes. The flight time from launch to interception of satellites at semi-synchronous or geosynchronous orbits would be several hours, permitting evasive maneuvering by the target. Such long flight times would also result in loss of surprise, which is important for attacks on targets such as early-warning satellites.

Thus the use of directed energy weapons has attracted some attention. These weapons could be either ground-based or space-based. Published reports suggest that the United States could test a ground-based laser against targets in geosynchronous orbit by the end of this decade. Tests of a space-based laser of somewhat lesser range could begin by 1992. However, this space laser would pose serious questions concerning compliance with the 1972 ABM Treaty, and thus no decision has been made to conduct such a test.

The Soviet Union could also introduce a variety of improved ASATs. With continued testing, they will eventually perfect the thus far unsuccessful passive optical guidance for their present ASAT. Because the general trend in the Soviet ASAT program has been toward reducing the flight time from launch to interception, we might expect to see the introduction of a non-orbital "pop-up" ASAT, which would intercept its target within a few minutes after launch. The present Soviet system could be used in this mode if it were provided with a guidance system capable not only of bringing it to a specified point in space, but also at a specified time. Large ground-based radar could be used to overcome target countermeasures such as maneuvering, jamming or decoys. These radars could also be used in support of an air-launched system similar to the new U.S. ASAT, which could use planes such as the Foxbat fighter or the Blackjack bomber as launch platforms. Such systems would pose serious problems for verification of a treaty that included a ban on deployment.

For several years Defense Department officials have reported that the Soviet Union might soon launch a large laser into orbit. Given the pace and schedule of the U.S. space laser program, the state of Soviet work in this field and the Soviet tendency to move to field testing of prototypes at an earlier stage than is the case in U.S. programs, this prediction is not unreasonable. It tends to create the impression that a Soviet space laser would convey a military benefit, which is not the case. Nevertheless, testing of a space-based weapon would be regarded as development of a space-based ABM system, specifically banned by the ABM Treaty.

asked "the scientific community in our country . . . to turn their great talents now to the cause of mankind and world peace; to give us the means of rendering these nuclear weapons impotent and obsolete. . . . I am directing a comprehensive and intensive effort to define a long-term research and development program to begin to achieve our ultimate goal of eliminating the threat posed by strategic nuclear missiles." And on March 27, 1983, Secretary of Defense Caspar Weinberger said on the "Meet the Press" television program, "The defensive systems the President is talking about are not designed to be partial. What we want to try to get is a system which will develop a defense that is thoroughly reliable and total, yes. And I don't see any reason why that can't be done."

The President and the secretary are clearly talking about "assured survival," as an alternative to deterrence of nuclear war by threat of retaliation. But to eliminate the fear of nuclear weapons, even of delivery of nuclear weapons by ICBMs, in the presence of the almost 10,000 strategic reentry vehicles on either side, is more than we believe the United States or the Soviet Union can accomplish. ICBMs take about 30 minutes to fall to their targets, as do submarine-launched ballistic missiles (SLBMs) of intercontinental range. Shorter-range SLBMs and the notorious intermediate-range nuclear forces (INF) may take ten minutes. Thus to be useful against ballistic missiles a system must do its job within 30 minutes or not at all. A space-based defense which would prevent 50 percent of the reentry vehicles from landing would be doing a pretty good job; one which prevented 90 percent would be an active defense beyond experience. Yet achieving even such defenses would simply result in the elimination of some of the marginally useful targets for nuclear weapons and would focus the remainder (for

Figure 1. Destructive mechanisms

Mechanism	Device	Operation
Pulsed laser	X-ray laser Excimer laser	Deliver a high impulse or shock to a missile to break or blow a hole in it and cause structural collapse of the booster
Continuous wave laser	Free electron laser Excimer laser Hydrogen fluoride/deuterium fluoride laser	Stay on target until a hole is burned through it, then switch to another target
Continuous particle beam	Neutral particle beam	Destroy internal weapon components
Mass accelerator	Kinetic energy rail gun	Accelerate small homing hit-to-kill vehicles (non-nuclear kill)
Self-propelled missile	Miniature homing vehicle	Infrared sensor senses spot of radiation from incoming re-entry vehicle. Homes in and destroys with hit-to-kill vehicle

Source: Department of Defense, as cited by Richard D. DeLauer, undersecretary of defense for research and engineering, in his testimony before the House Armed Services Committee, Nov. 10, 1983.

IN HIS MARCH 23, 1983 speech, President Reagan

deterrence or for "compellence") on the society's centers of value—industry and population.

Recognizing the difficulty or impossibility of having any system which will provide 99.99 percent protection (to reduce the expected number of warheads striking their targets to less than one), advocates of such programs rely on arithmetic, asserting that a defense of four totally independent layers, each of which allows only 10 percent of the incoming weapons to leak through, will allow an average of only one in 10,000 weapons through all four layers. This assumes that there are no common-mode failures (that is, if a reentry vehicle leaks through one layer, it will automatically leak through another) in which case the number leaking through increases by a factor 10, 100 or 1,000. Furthermore, the *assumption* of four layers, each with 10 percent leakage, does not guarantee the existence of even *one* such layer. Finally, if four independent defenses can be found which are compatible with layering, all four must be paid for, maintained, and not allowed to interfere with one another.

For 20 years the fact that one can "hit a bullet with a bullet" has not solved the ballistic missile defense problem. That solution requires not only the application of science and technology but also the assurance that the scientists, technologists and investors of the other side will not be able to *counter* the defenses. The fact that one nuclear warhead can kill a million people and do at least \$100 billion worth of property damage makes it very important to prevent access by even one reentry vehicle. Obviously it is essential to know whether such a perfect defense is possible. A nation possessing such a defense need not be deterred from destroying its adversary, since it could protect totally against retaliation in case it launched a nuclear attack. Of course, not only the feasibility but also the *counterability* of such a defense is important, and neither side need promise to lie down and play dead if the other side develops and deploys a defense which promises to be effective against the "unadapted" force.

We went through this in the 1960s, when U.S. perceptions of the emergence of a ballistic missile defense by the Soviet Union led Secretary of Defense Robert McNamara to authorize the development of MIRVed Minuteman missiles, thereby countering the nascent Soviet ballistic missile defense and increasing greatly the flexibility of the U.S. strategic offensive force and the threat to the Soviet Union.

What is new? Not the desire to feel free from the threat of destruction! That is as old as human beings, and many have availed themselves of that desire by retreating to a world of unreality. New are the existence of high-speed flexible computation in small packages; optical lasers for viewing and for concentrating potentially damaging radiation at a distance; complex focal-plane arrays for viewing large areas with reasonable resolution; and the prospect of the soft X-ray laser pumped by a nuclear explosion which can hope to focus one one-thousandth or one ten-thousandth of the energy of a nuclear weapon into one-millionth or one-billionth of the sphere, corresponding to an increase of X-ray intensity over that provided by the same nuclear

explosion by a factor 100 or 1,000 (or 100,000 or one million).

Furthermore, a ten-fold larger nuclear weapon exploded at 1 percent of the distance would correspond to a 100,000-fold increase in intensity over the reference weapon, so that there is a tradeoff (assuming operationally and technically feasible X-ray lasers) between their use and the pre-deployment of X-ray defenses. In fact, the X rays from a nuclear explosion may be much more effective than those from an X-ray laser, for the same energy delivered to the target.

ANY SUCCESSFUL manager or leader strives to eliminate potentially unsuccessful candidates as quickly as possible, and if defensive systems can be shown to be vulnerable, that is as good a way to eliminate them as showing them to be technically infeasible. Because defensive systems are far more complicated than offensive systems, the offense has time to adapt to a defense of potentially great effectiveness.

Thus the United States has long done major research and field testing on penetration aids against terminal and mid-course ballistic missile defense. It may not carry those "pen-aids" on its ICBMs and SLBMs since it is confident that no such defenses exist. Nevertheless, if the Soviet Union initiated a multi-year deployment of ballistic missile defenses the United States certainly would have pen-aids ready in time. At the cost of a small fraction of the warheads now carried on the strategic offensive force, the remaining warheads would have a high probability of penetration to their targets. An estimate of the penetration probability of the *unadapted* force might yield a totally different result, but it would not be relevant.²

Midcourse intercept of reentry vehicles continues to be frustrated by the feasibility of balloon decoys to fool radar and infrared and optical sensors.

The boost phase of an adapted offensive force lasts a short time (40–100 seconds), and defensive systems stationary with respect to the likely launch areas are either based on the Earth, in its atmosphere or in GEO (in any case 10,000 or 40,000 kilometers from the launch). It is thus not possible to attack with rocket-propelled defenses, unless the rockets can be fired *before* ICBM or SLBM launch, in confidence that the offensive weapons will be launched only to be destroyed! Considering systems based in orbit, cross-track capability out to 250 kilometers could be obtained from vast numbers of small interceptors which burn 90 percent of their initial mass as rocket fuel, but some 3,000 would be required in orbit to have one close enough to destroy a single ICBM. If no more than 100 silos are located within a circle 500 kilometers in diameter, 300,000 of these orbital rockets would be required even if they were 100 percent effective and reliable. (Of course, a mere 3,000 "space trucks" each carrying 100 interceptors could do the job, but they would be vulnerable to space mines.)

As for beam weapons, a simple calculation shows that a fluence (energy per unit area) exceeding ten kilojoules per square centimeter is required to damage a rocket booster which has been modified to survive against optical or X-ray lasers. For optical lasers, we have the usual tension bet-

ween basing in synchronous orbit (at some 40,000 kilometers from their targets and viewing the ICBM or SLBM launch sites all the time), and basing them in LEO, where they could use effective ranges as short as 1,000 kilometers. But in LEO they would have to reckon with the facts that the Earth's surface area is 500 million square kilometers and that the area coverable by a weapon at 1,000 kilometers is only 3 million square kilometers. If the effective range of a laser were to be taken as 1,000 kilometers instead of 40,000 kilometers, its power need be only one sixteen-hundredth as great (or its mirror diameter one-fortieth as large), but it would have to slew over a much wider angle to catch all the boosters within its purview, and 170 lasers in LEO would put only one within range of a particular launch. Furthermore, any laser would have to be able to destroy as many as several hundred boosters during the couple of minutes of boost phase.

Assuming the existence of one-megawatt lasers in the midwavelength range (perhaps three microns) and a boost phase for an adapted strategic offensive missile of 120 seconds, a laser could destroy one ICBM if it illuminated it for 100 seconds at a power of 100 watts per square centimeter to meet the assumed kill criterion of 10 kilojoules per square centimeter. At this wavelength, however, a mirror three meters in diameter would provide a spot 100 meters in diameter and the intensity from a 100-megawatt laser would be only one watt per square centimeter instead of the required 100. Therefore to destroy even a single ICBM in boost phase from GEO would require an optically perfect mirror 30 meters in diameter and a laser of 100 megawatts. One can assume that the problem of mirror accuracy can be solved by segmenting the mirror and controlling it adaptively, and that the problem of increasing laser power will yield to development. Nevertheless, these are only assumptions, and the problems of transporting the laser and its fuel to GEO and paying for it will remain. At a laser yield of about 500 joules per gram of fuel, the fuel for a single such intercept (using 100 megawatts of light for 100 seconds) weighs 20 tons and would take some 3 shuttle launches at \$90 million each, to place the fuel for a single intercept into GEO (\$300 million).

If one could have a laser of 0.3 micron wavelength (ultra-violet) instead of 3 micron and a mirror 30 meters in diameter with adequate reflectivity at this wavelength, and with the required ten times better perfection of its figure, the fuel requirement would fall by a factor 100. Nevertheless, such vastly expensive systems on satellites are easily countered by space mines or other ASAT means. No less a defense proponent than Edward Teller has testified and indicated in many interviews that no defensive system can depend upon satellites because they are "costly to put up and cheap to shoot down."

Furthermore, the vulnerability of the booster itself can be greatly reduced by various means: by rotating it, thereby spreading the heat over a larger region; by concealing it in smoke; by interposing reflecting foils so as to hide the booster itself; by deceiving the laser as to its position; and even by launching dummy boosters without warheads or

silos, to provoke the defense to attack substantially more "ICBMs" than really exist, thus driving up the cost of defense. The ultimate problem for satellite-based lasers, or any orbital defensive system, is vulnerability to space mines — small satellites based in orbit in peacetime, remaining always in lethal range of their quarry satellites and ready to explode on command.

Some (notably George Keyworth, Jr., the President's science advisor) have advocated reducing the cost of such a system by placing the lasers and their fuel supply on the ground, directing the beam upward through the atmosphere by adaptive optics to compensate not only for imperfections of the mirror but also for the turbulent optical properties of the atmosphere. Such a ground-based laser would illuminate a relay mirror in orbit, which would then send the beam to other "fighting mirrors" which would direct the beam first at one booster and then at another. These

"The President's defensive technologies initiative is a spectacularly ambitious one. Quite simply, it will require a scientific, technical, military, and organizational undertaking that will dwarf anything ever before mounted by the human race. . . .

I believe that mutual assured destruction is a morally bankrupt philosophy that places Government in the untenable position of refusing to defend its citizenry. What the President has proposed is no less than a moral recovery in American strategic policy which would take us from the horror of MAD to the promise of mutual assured protection. It is a goal which deserves the fervent support of all who yearn for a world safe from nuclear weapons. Unless we are willing to accept the prospect of a nuclear Pearl Harbor from space, we must now join the President in a new national commitment to mutual assured protection."

—Ken Kramer (R-Colorado)

Statement before the Subcommittee on Research and Development, House Armed Services Committee, Nov. 10, 1983, advocating the People's Protection Act. The Act was co-sponsored by Representatives Montgomery (D-Mississippi), Whitehurst (R-Virginia), Badham (R-California), Skelton (D-Missouri), Corcoran (R-Illinois), Davis (R-Michigan), Daniel Crane (R-Illinois), Hunter (R-California), Dyson (D-Missouri), Hartnett (R-South Carolina) and Skeen (R-New Mexico).

mirrors also would be of very substantial size and cost and also vulnerable to space mines. As an additional element of vulnerability, the ground-based lasers could be put out of action by cloud, dust or sabotage.

The other type of damaging energy that can be projected at nearly the speed of light consists of particles given their energy by particle accelerators in space. Although charged particles can be accelerated with efficiencies above 50 percent, they are bent by the Earth's magnetic field. Conversion of the charged particles to neutral particles can also be done with reasonable efficiency, but the quality of the

beam is spoiled, and the angular spread introduced dilutes the fluence at the target. The negative hydrogen atom, however, is unique among charged particles and would present a considerably smaller angular spread. The problems of developing and deploying a particle-beam defense even against a non-reactive adversary are enormous, but the system is ultimately vulnerable to space mines or to other ASAT weapons.

NEW SINCE Garwin's article in the May 1981 *Bulletin* is the X-ray laser driven by a nuclear explosive.³ This "recombination-pumped" laser produces a low-density plasma by absorbing the energy from a nuclear explosion in space, at some 100 centimeters from a set of metal wires pointing at a distant target. Almost all the energy from the fission or fusion process in a space explosion resides initially in the thermal energy of the bomb materials or in the radiation energy of its volume; this energy can be radiated as thermal X rays before the materials of the weapon can expand far enough to acquire a substantial fraction of the bomb energy as kinetic energy. The relatively "hard" X-ray photons from the bomb are to be absorbed in copper or zinc, expanding the wires which continue to absorb photons and lose electrons, which then recombine selectively to populate the upper levels of the ions. Since no mirrors are available at these X-ray wavelengths and fluences, the angular aperture of the X-ray beam is at least as big as the angular aperture of one of the lasing rods—roughly the ratio of width to length—which in the example is about 1,000 microradians.

There are many problems in making a laser and many further problems in making an effective weapon from that laser. One might hope to achieve a transformation of 0.1 percent of the bomb energy into directed X rays, and if one uses the one milliradian angular aperture, this corresponds to a fluence from GEO of 0.1 percent of the bomb energy (which might be 20 kilotons) over a diameter on the order of 40 kilometers, or 0.01 joules per square centimeter which would not damage missiles or even satellites. The mechanism of damage by a short pulse of soft X rays consists of the blowoff of the thin surface layer absorbing the X rays, creating a shockwave going through the skin of the missile and an impulse communicated to the skin.⁴ Because the laser X rays in the example are so soft, they are absorbed in a very thin layer of the order of 0.1 milligram per square centimeter and the resulting impulse is substantially less than that communicated by a similar fluence of hard X rays.

The particle beams and soft X-ray lasers can be negated by the same hardened, fast-burn boosters which cause so much trouble for a chemical laser system. Burning out below 80 kilometers, the booster is shielded by sufficient air to absorb the X-ray laser beam kilometers from the booster and to strip any hydrogen atom beam, allowing the resulting protons to be swept off target by the Earth's magnetic field.

Options

The preceding technical sketch suggests the vast range

of choices available for attack on fragile satellites and the much greater difficulty associated with a defense which would "render nuclear weapons impotent." But as ASAT weapons, lasers and particle beams seem to offer only increased delay and higher cost, in comparison with space mines for which present technology would suffice.

The 1972 ABM Treaty already bans the development or testing (and even more the deployment) of ABM systems that are mobile, space-based or air-based, and President Reagan has stated that the United States would explore defensive possibilities within the constraints of that Treaty. Furthermore, many of the capabilities conferred by the adversary's satellites can be negated by means other than ASAT weapons—jamming, attack on ground stations, concealment and the like. Calamitous effects of attack on one's own satellites can be avoided by prudent planning, replacement capabilities, backup systems, and so forth.

Can one prove with certainty that space weapons will lead to disaster rather than to improved security or that global defense against ballistic missiles is impossible? If not, how do we dare deny ourselves these options? Are we joining the ranks of those who denied the possibility of airplane flight or of an ICBM bearing a nuclear warhead?

Over the years we have considered three possibilities concerning space weapons:

- no additional arms control measures in space;
- banning all military activities in space; and
- banning weapons in space.

In our opinion, the combination of a program for nullifying nuclear weapons by space means and the necessity for satellite components of any such system is a most severe threat to U.S. national security. That combination can convert the present world (with the universally acknowledged ability to destroy the Soviet Union, the United States, their allies and perhaps much of human life in the Northern Hemisphere) from a stable confrontation to an inherently unstable one, needing only the smallest spark to bring on a nuclear conflagration. This instability can arise from appearances—it does not need real capability. Pointing a toy handgun at a police officer is as good a way to be shot by the officer's partner as pointing a real gun. A supposedly effective ABM system depending on space elements could be countered by space mines within lethal range of the satellites. An attempt to prevent such vulnerability could be enforced in the early stages of deployment only by the destruction of the other side's missiles while it was launching space mines.

Banning all military activity from space seems neither necessary or desirable, since "military" applies to communication, navigation, administration, supply and other normal functions when performed for military personnel. The matter has also been discussed in the U.N. Committee on Disarmament, and even to that body a total ban on military activities seems neither practical nor desirable. Uninhibited ASAT development, in a protracted drive for space-supported defense (ICBM-killers), appears likely to lead to instability and attack even in peacetime.

During the U.S.-Soviet ASAT negotiations of 1978–1979, many options were considered, including the possession by

each side of a single type of ASAT system, the provision of sanctuary to satellites above a certain altitude, a total ban on damage to or destruction of satellites and the like. The negotiations were not resumed after the Soviet invasion of Afghanistan, but in 1981 the Soviet Union introduced into the United Nations a draft "treaty on the prohibition of the stationing of weapons of any kind in outer space." Unfortunately, that treaty appeared to convey protection only to those "space objects . . . placed in orbit in strict accordance with . . . this treaty" and to sanction the use of force against other satellites. Furthermore, the 1981 Soviet draft covered only space-based systems, thus permitting current Soviet and U.S. ASATs.

In September 1982, at a Senate Foreign Relations Committee hearing on the militarization of space, Richard Garwin testified that the 1981 Soviet draft should not be ignored and that if the U.S. government did not reply with a draft which would serve U.S. purposes, then even a private group might forward the cause of U.S. security by doing so. In May 1983 Admiral Noel Gayler, Kurt Gottfried and Garwin testified to the same committee in support of "A Treaty Limiting Antisatellite Weapons," which we had helped prepare, with the support of the Union of Concerned Scientists (see page 105). The Soviet Union followed in August by introducing into the United Nations a new draft treaty "On the Prohibition of the Use of Force in Outer Space and from Outer Space with Regard to Earth" (see page 115). Aside from what seems to be a totally unnecessary and unacceptable provision "not to test, nor use, for military, including counter-satellite ends, any manned spaceships," this 1983 Soviet draft provides a very suitable basis for early agreement.

Recommendations

The greatest urgency is to negotiate quickly a ban on weapons in space, starting with the Soviet draft of 1983, because it is presumably largely acceptable to the Soviet Union. Although it might be argued that in principle a better agreement could be obtained by going into more detail and taking longer to analyze and to negotiate, the situation is not static and the benefits of an early, all-encompassing agreement far outweigh any advantages which might follow from more detailed consideration.

The United States of course should take unilateral steps to make its military capabilities effective and robust against violation of such an agreement. This means, for example, backup communication and navigation systems for theater war. The United States should also (and the Soviet Union probably will) develop means for reducing the effectiveness of opposing satellite-based systems for support of conventional or nuclear military operations, short of putting weapons into space or damaging or destroying satellites. These measures could include jamming of communication links, decoys to deceive radar satellites and preparations for attack on ground stations not as safeguards necessitated by an ASAT ban, but as prudent self-interest.

An ASAT ban like that of our May 1983 draft or the Soviet draft of August 1983 cannot be expected to protect satellites

Glossary of technical terms

geosynchronous orbit (GEO)—orbit in which a satellite remains stationary over a given area on Earth
hard X ray—one having short wavelength and high penetrating power
joule—unit of work or energy equivalent to 10^7 ergs or about 0.7375 foot-pounds or 0.2390 gram calories
kilo—1,000
low-earth orbit (LEO)—orbit 100 to 500 kilometers in height
micro—one-millionth
micron—one-millionth of a meter or one-thousandth of a millimeter
optical guidance system—active: emits energy which is reflected from an object; this reflected energy is then used for targeting; passive: senses energy from an object for targeting
plasma—ionized gas containing about equal numbers of positive ions and negative electrons. Differs from ordinary gas in being a good conductor of electricity and being affected by a magnetic field
radian—angular measurement equal to the angle at the center of a circle subtended by an arc equal in length to the radius of the circle; about 57.29 degrees
soft X ray—one having comparatively long wavelength and poor penetrating power
watt—power which produces energy at the rate of one joule per second; 1/746 horsepower

in an all-out nuclear war. Nor can one realistically (or verifiably) eliminate residual threats to satellites, such as the nuclear-armed Soviet ABM system deployed at Moscow since before 1972 and permitted by the 1972 ABM Treaty. It would not eliminate the possibility of satellite destruction by a nuclear-armed ICBM launched to attack a "point-in-space" rather than a ground target. On the other hand, all the United States would renounce under an ASAT ban would be attack on Soviet satellites (and those of other countries) and some other roles for space weapons in war, (for example, attack on high-flying aircraft) which could better be performed by sensors in space and weapons launched from air or ground.

Regarding the denial of space for emplacing weapons for global defense, the proposed agreement would simply reinforce the constraints of the ABM Treaty, which President Reagan said the United States would observe in any case. We could and should continue to do theoretical and laboratory research on potential defensive systems, and a five-year review provision of a treaty of indefinite duration (as in the case of the ABM Treaty) would provide the opportunity to adapt the Treaty to technical and political realities and opportunities as they arise. □

1. Richard L. Garwin, "Are We on the Verge of an Arms Race in Space?" *Bulletin* (May 1981), pp. 48–53.

2. A.B. Carter and D.N. Schwartz, eds., *Ballistic Missile Defense* (Washington, D.C.: The Brookings Institution, 1984).

3. Since there appear to be no recent unclassified technical articles by U.S. workers in this field available, we use results of Soviet research. F.V. Bunkin, V.I. Derzhiev and S.I. Yakovlenko, "Specification for Pumping X-Ray Laser with Ionizing Radiation," *Soviet Journal of Quantum Electronics* (July 1981), pp. 971–72.

4. Hans A. Bethe and Richard L. Garwin, "Anti-Ballistic Missile Systems," *Scientific American*, 218 (March 1968), pp. 21–31.

A treaty limiting anti-satellite weapons

Draft treaty presented to the U.S. Senate Foreign Relations Committee in May 1983 by the Union of Concerned Scientists et al.

Article I

Each Party undertakes not to destroy, damage, render inoperable or change the flight trajectory of space objects of other States.

Article II

1. Each Party undertakes not to place in orbit around the Earth weapons for destroying, damaging, rendering inoperable, or changing the flight trajectory of space objects, or for damaging objects in the atmosphere or on the ground.

2. Each Party undertakes not to install such weapons on celestial bodies, or station such weapons in outer space in any other manner.

3. Each Party undertakes not to test such weapons in space or against space objects.

Article III

1. For the purpose of providing assurance of compliance with the provisions of this treaty, each Party shall use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law.

2. Verification by national technical means shall be supplemented, as appropriate, by such cooperative measures for contributing to the effectiveness of verification by national technical means as the Parties shall agree upon in the Standing Consultative Commission.

3. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1 of this Article.

4. Each Party undertakes not to use deliberate concealment measures which impede verification by national technical means of compliance with this treaty.

Article IV

1. To promote the objectives and implementation of the provisions of this treaty, the Parties shall use the Standing Consultative Commission, established by the Memorandum of Understanding Between the Government of the United States of America and the Government of the Union of Soviet Socialist Republics regarding the Establishment of a Standing Consultative Commission of December 21, 1972.

2. Within the framework of the Standing Consultative Commission, with respect to this treaty, the Parties will:

a) consider questions concerning compliance with the obligations assumed and related situations which may be considered ambiguous;

b) provide on a voluntary basis such information as either Party considers necessary to assure confidence in compliance with the obligations assumed;

c) consider questions involving unintended interference with national technical means of verification, and questions involving unintended impeding of verification by national technical means of compliance with the provisions of this treaty;

d) consider, as appropriate, cooperative measures contributing to the effectiveness of verification by national technical

means;

e) consider possible changes in the strategic situation which have a bearing on the provisions of this treaty, including the activities of other States;

f) consider, as appropriate, possible proposals for further increasing the viability of this treaty, including proposals for amendments in accordance with the provisions of this treaty.

Article V

The Parties undertake to begin, promptly after the entry into force of this treaty, active negotiations with the objective of achieving, as soon as possible, agreement on further measures for the limitation and reduction of weapons subject to limitation in Article II of this treaty.

Article VI

In order to ensure the viability and effectiveness of this treaty, each Party undertakes not to circumvent the provisions of this treaty, through any other State or States, in any other manner.

Article VII

Each party undertakes not to assume any international obligation which would conflict with this treaty.

Article VIII

1. Each Party may propose amendments to this treaty.

2. Agreed amendments shall enter into force in accordance with the procedures governing the entry into force of this treaty.

Article IX

This treaty shall be of unlimited duration.

Article X

Each Party shall, in exercising its national sovereignty, have the right to withdraw from this treaty if it decides that extraordinary events related to the subject matter of this treaty have jeopardized its supreme interests. It shall give notice of its decisions to the other Party six months prior to withdrawal from the treaty. Such notice shall include a statement of the extraordinary events the notifying Party regards as having jeopardized its supreme interests.

Article XI

1. This treaty shall be subject to ratification in accordance with the constitutional procedures of each Party.

2. This treaty shall enter into force on the day of the exchange of instruments of ratification.

Article XII

1. Done in two copies, each in the English and Russian languages, both texts being equally authentic.

2. This treaty shall be registered pursuant to Article 102 of the Charter of the United Nations.

Treaty on the prohibition of the use of force in outer space and from space against the Earth

Presented by the Soviet Union to the General Assembly of the United Nations in August 1983

Article 1

It is prohibited to resort to the use or threat of force in outer space and the atmosphere and on the Earth through the utilization, as instruments of destruction, of space objects in orbit around the Earth, on celestial bodies or stationed in space in any other manner.

It is further prohibited to resort to the use or threat of force against space objects in orbit around the Earth, on celestial bodies or stationed in outer space in any other manner.

Article 2

In accordance with the provisions of article 1, States Parties to this treaty undertake:

1. Not to test or deploy by placing in orbit around the Earth or stationing on celestial bodies or in any other manner any space-based weapons for the destruction of objects on the Earth, in the atmosphere or in outer space.

2. Not to utilize space objects in orbit around the Earth, on celestial bodies or stationed in outer space in any other manner as means to destroy any targets on the Earth, in the atmosphere or in outer space.

3. Not to destroy, damage, disturb the normal functioning or change the flight trajectory of space objects of other States.

4. Not to test or create new anti-satellite systems and to destroy any anti-satellite systems that they may already have.

5. Not to test or use manned spacecraft for military, including anti-satellite, purposes.

Article 3

The States Parties to this treaty agree not to assist, encourage or induce any State, group of States, international organization or natural or legal person to engage in activities prohibited by this treaty.

Article 4

1. For the purpose of providing assurance of compliance with the provisions of this treaty, each State Party shall use the national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law.

2. Each State Party undertakes not to interfere with the national technical means of verification of other States Parties operating in accordance with paragraph 1 of this article.

Article 5

1. The States Parties to this treaty undertake to consult and co-operate with each other in solving any problems that may arise in connection with the objectives of the treaty or its implementation.

2. Consultations and co-operation as provided in paragraph 1 of this article may also be undertaken by having recourse to appropriate international procedures within the United Nations and in accordance with its Charter. Such recourse may include utilization of the services of the Consultative Committee of States Parties to the treaty.

3. The Consultative Committee of States Parties to the treaty shall be convened by the depositary within one month after the receipt of a request from any State Party to this treaty. Any State may nominate a representative to serve on the Committee.

Article 6

Each State Party to this treaty undertakes to adopt such internal measures as it may deem necessary to fulfill its constitutional requirements in order to prohibit or prevent the carrying out of any activity contrary to the provisions of this treaty in any place whatever under its jurisdiction or control.

Article 7

Nothing in this treaty shall affect the rights and obligations of States under the Charter of the United Nations.

Article 8

Any dispute which may arise in connection with the implementation of this treaty shall be settled exclusively by peaceful means through recourse to the procedures provided for in the Charter of the United Nations.

Article 9

This treaty shall be of unlimited duration.

Article 10

1. This treaty shall be open to all States for signature at United Nations Headquarters in New York. Any State which does not sign this treaty before its entry into force in accordance with paragraph 3 of this article may accede to it at any time.

2. This treaty shall be subject to ratification by signatory States. Instruments of ratification and accession shall be deposited with the Secretary-General of the United Nations.

3. This treaty shall enter into force between the States which have deposited instruments of ratification upon the deposit with the Secretary-General of the United Nations of the fifth instrument of ratification, provided that such instruments have been deposited by the Union of Soviet Socialist Republics and the United States of America.

4. For States whose instruments of ratification or accession are deposited after the entry into force of this treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

5. The Secretary-General of the United Nations shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or accession, the date of entry into force of this treaty as well as other notices.

Article 11

This treaty, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations, who shall send duly certified copies thereof to the Governments of the signatory and acceding States.

Effect on strategic stability

by Yevgeny P. Velikhov

TWO DISTINCT DIRECTIONS in space militarization have recently emerged—the creation of anti-satellite weapons (ASAT) and the development of space-based anti-missile systems (SBAMS). These two directions, I believe, are closely meshed with the problems of strategic balance and stability, and with prospects for substantial nuclear arms reductions.

With regard to anti-satellite weapons my impression is that their proponents in the United States have not adequately considered the real functions such weapons could have in the overall strategic context.

American scientists have explained to my colleagues and me that the advocates of U.S. anti-satellite systems push their plans through only because the Soviet Union is rapidly developing such systems. But the Soviet leadership has authoritatively and concretely declared that it unilaterally assumes the obligation not to test and deploy anti-satellite systems, and that it proposes to reach an agreement with all countries not to acquire new anti-satellite systems and to eliminate all the existing systems. Thus, the argument used by supporters of the U.S. ASAT system becomes completely groundless and unpersuasive.

As for the strategic consequences of the deployment of these weapons, if they were used, the side attacked would have to consider the hypothetical massive use of offensive nuclear weapons that could follow.

An attempt to destroy the opponent's satellites or even to "blind" them for some period of time can be justifiably regarded as the first step in initiating unlimited nuclear war. Destruction of the satellites would give every reason to the attacked side to retaliate immediately, destroying all possible enemy targets, without waiting for a nuclear attack on their own, launching complexes and other military and civil targets.

The creation of a constant threat to satellites through the deployment of an anti-satellite system will impair the prospects of reaching agreements on a freeze of nuclear weapons, deep reductions, and confidence in their verification. Even without this threat the verification problem is used in the United States as an argument to frustrate existing agreements.

Research by the Committee of Soviet Scientists on the problem of a freeze is nearing completion. But preliminary results show that existing national technical means of verification, based on the use of appropriate equipment on

satellites, are good enough to verify agreements on the freeze of a wide range of weapon systems at various stages of development. In this connection I should emphasize that we must strengthen and not undermine confidence in national technical means. Invulnerability of satellites used for verification purposes is an important stabilizing politico-psychological factor and an indispensable technical part of a freeze agreement as well as of START and other negotiations.

In light of the decision by the U.S. side to reject a ban on ASAT weapons, we have the full right to doubt the seriousness of U.S. intentions to reach an agreement at the START talks.

It should be added that any hope of getting significant unilateral advantage from a strategic or political-military point of view is absolutely groundless. There are those who have great expectations for the technical sophistication of the U.S. anti-satellite system. In my view, however, judging by the record of the postwar decades, the United States has no chance of creating a tangible breakthrough in qualitative weapon-systems characteristics which would leave the Soviet Union far behind. And even if one side achieves short-term qualitative advantages, the other side can compensate by greater quantity.

RESEARCH AND development of space-based anti-missile systems as basic elements of wide-scale strategic "defense" have had a very powerful political and monetary impetus. But to my mind, those who insist on this kind of system with its attendant huge expenditures—claiming that it is the way to eliminate the threat of nuclear war to the United States and the whole world—do not see the whole complex of scientific and technological problems and possible consequences affecting strategic stability and international security.

A special research project on this problem was recently completed by the Committee of Soviet Scientists' Working Group headed by R. Sagdeev and A. Kokoshin.* The study gave particular attention to the potential weapon systems that could be created on the principle of directed energy transfer—weapon systems which are the subject of active debate in the United States today. Several types of energy sources at different stages of technical development were considered as possible components for a directed energy weapons system—lasers working in infrared, visible or ultraviolet range; X-ray lasers pumped by nuclear explosion; high-energy particle accelerators; UHF (ultra-high frequency) or microwave generators.

According to published information the hydrogen-fluoride infrared lasers seem to be at the most advanced stages of technical development in the United States. It is assumed that the prototype space-based anti-missile systems would include a five-megawatt laser and four-meter diameter mirror. Such a system could presumably be developed within



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eight to ten years. According to the estimates by the Sagdeev-Kokoshin group, a space-based anti-missile system having approximately 18 orbital stations would be capable of destroying only about 15 ICBMs in 100 seconds (assuming massive launch), or up to 100 ICBMs in 15 minutes (assuming time-scattered launch). It is assumed that the launch sites would be within the range of two orbital stations simultaneously. A technically feasible improvement—some 10 to 20 kilojoules per square centimeter—of resistance to laser energy would make such a system incapable of destroying ICBMs.

The Working Group's estimates indicate further that development of a SBAMS effective enough to destroy 1,000 ICBMs in 100 seconds would require an increase in mirror diameter from four to 15 meters; in laser power capacity from five to 60 megawatts; and in fuel capacity from 45 to about 700 or 800 metric tons. Obviously, development of systems with these capabilities is currently beyond existing technical possibilities; considerably more intense research and development, on a wider scale, would be needed.

Still another requirement would be the development of a new heavy space launcher, much larger than the current space shuttle. Three to four times greater laser power capacity and two to three times larger mirror diameter would also be required if ICBM resistance to laser beams were further improved.

According to Western sources the development of neutral particle-beam accelerators which could be used in space-based anti-missile systems is not as advanced as the development of high-power lasers, and their construction would take considerable technical effort. The same situation obtains for the UHF generator-based system. Serious technical criticism could also apply to the possible uses of X-ray lasers.

The estimates mentioned above for large-scale space-based anti-missile systems using chemical lasers—up to 60 megawatts in power and with 15-meter mirror diameter—are related to a hypothetical "ideal" full-scale system, supposedly 100 percent reliable both technically and operationally. Obviously real SBAMS would not be absolutely reliable and would need backup duplicating components. The orbital stations themselves might have to be duplicated to compensate for technical unreliability. Operational unreliability would require the development of multi-layer SBAMS (having, in particular, traditional anti-missiles based on land or in space as an additional component). This has been under active consideration in the United States in recent years.

Even high operational reliability cannot guarantee absolute protection. For instance, a three-layer system, with 90 percent operational reliability for every layer, if used against 1,000 ICBMs with, say, 10 warheads each, would be expected to let through some 10 warheads. These could inflict tremendous damage.

Construction of effective SBAMS might require deployment of about 50 such platforms into polar orbits. Deploying fewer systems, in geosynchronous orbit, would take a

bigger investment because of higher costs associated with such orbits, additional requirements in laser power, focusing, accuracy and so on.

The total cost of such systems, according to the Sagdeev-Kokoshin Working Group, would roughly amount to \$400 billion. But that would be just one layer, which, as we have seen, would not be sufficient due to the need for redundancy.

THERE ARE SOUND reasons to believe that effective countermeasures could be taken more easily. According to the Group, such countermeasures would also be considerably cheaper—their cost amounting only to one or two percent of the total investment required for building a full-scale space-based anti-missile system. This cost ratio would probably also be preserved for the higher power capacity levels of the system and a consequent anti-system.

At a particular time, the side preparing a first strike can easily create a wide "window" among the battle platforms orbiting the Earth and use it for massive ICBM or SLBM attack. Thus the vulnerability of the system to counter-

"All attempts at gaining military superiority over the U.S.S.R. are futile. The Soviet Union will never allow them to succeed. It will never be caught defenseless by any threat.

Let there be no mistake about this in Washington. It is time they stopped devising one option after another in search of the best ways of unleashing nuclear war in the hope of winning it. Engaging in this is not just irresponsible, it is insane."

—Yury Andropov

Replying to President Reagan's Star Wars speech in an interview in Pravda, March 27, 1983.

measures is the main factor leading to the view that such a system is intended for assuring a successful first strike. A strike could be launched against both offensive forces and anti-space ballistic missile defense systems of the other side, with the hope of reducing their ability to retaliate, while protecting itself with the space-based systems from such retaliation.

All this allows the conclusion that the deployment of even "ideal" systems would not assume (its proponents claim) a shift from the MAD (mutual assured destruction) posture—from the "strategy of deterrence based upon the threat of retaliation" to the defense-oriented strategy based on the ability to assure protection from a full-scale ICBM attack. On the contrary, the deployment of such a system would significantly complicate the maintenance of deterrence, making it highly unstable, for it would stimulate the illusion of advantages (damage limitation and even a chance for surviving nuclear war) associated with a first strike.

There are good reasons to believe that if both sides possessed space-based systems the destabilizing effect would be much greater than if such systems were available to only one side. In the context of strategic logic (without consider-

Figure 2. U.S. and Soviet satellites in orbit

Orbit	Mission	United States		Soviet Union	
		1983	1989	1983	1989
Low					
100–500 kilometers	Photo reconnaissance	4	2	2	2
	Radar surveillance	—	—	2	2
	Electronic intelligence	6	—	—	—
	Manned	1	1	1	2
	Subtotal	11	3	5	6
Medium					
500–3,000 kilometers	Communication military	—	—	29	2
	Navigation	5	—	10	—
	Electronic intelligence	6	14	10	8
	Weather military	2	2	3	3
	Weather civil	2	2	1	1
	Remote sensing civil	1	1	1	2
	Subtotal	16	19	54	16
Semi-synchronous					
400 x 40,000 kilometers	Early warning	—	—	9	—
	Communication military	2	2	4	4
	Communication civil	—	—	8	—
	Subtotal	2	2	21	4
Semi-synchronous					
20,000 x 20,000 kilometers	Navigation	6	21	2	12
Synchronous					
36,000 x 36,000 kilometers	Early warning	3	3	—	3
	Electronic intelligence	4	4	—	—
	Communication military	20*	22*	—	12
	Communication civil	30**	65**	10	13
	Weather	2	2	—	1
	Subtotal	59	96	10	29
Total		94	141	90	67

*Includes NATO satellites

**Includes INTELSTAT satellites

Source: John Pike, "Anti-satellite weapons," *Federation of American Scientists Public Interest Report* (Nov. 1983), p. 3. Reprinted with permission of the author.

ing psychological and political aspects) this thinking arises from the fact that if both sides had these systems their impetus for a preemptive first strike would be greater, since each side could hope to secure an advantage by striking first.

As the Committee of Soviet Scientists noted, the U.S. refusal to undertake a no-first-use obligation and U.S. strategic programs aimed at acquiring a first-strike potential are additional reasons for considering prospective U.S. space-based systems as part of a first-strike strategy. An important element in implementing this policy is the deployment of U.S. medium-range missiles (particularly Pershing II) in Western Europe, aimed at "decapitation."

In contrast, the Soviet side, bearing in mind the tremendous importance of strengthening strategic stability in the

atmosphere of growing political-military tensions, in June 1982 undertook the unilateral obligation not to use nuclear weapons first. This position was afterwards confirmed more than once by the highest Soviet government and military leaders. This obligation is not only political and diplomatic in character; it has become an integral part of Soviet military training and entails additional scientific and technological decisions.

In line with this commitment much more attention is paid to the goal of preventing non-nuclear conflict from growing into nuclear. Thus, more rigid limits have been set for troop training and command, and stricter controls organized to make unauthorized launch of tactical or strategic nuclear weapons impossible.

Besides the likelihood of countermeasures to space-based anti-missile systems—for example, hardening of ICBM boosters—the Sagdeev-Kokoshin Working Group thinks it highly probable that there will emerge a weapon intended to neutralize these systems (counter- “anti-SBAMS”). I agree with those specialists who have concluded that during the development and deployment stages of SBAMS, penetration capabilities of strategic offensive forces, including their qualitative improvement, will be modernized more rapidly.

The development of SBAMS could stimulate an increase in the arsenals of strategic delivery vehicles and nuclear warheads, for example, strategic cruise missiles, including sea- and ground-launched cruise missiles. Cruise missile deployment is extremely difficult if not impossible to verify by national technical means, and U.S. experts who suppose that the United States can retain a monopoly on strategic cruise missiles are badly misled.

If tests of the space-based systems were to begin, to say nothing of their actual deployment, the permanent ABM Treaty signed on May 26, 1972, would be threatened. Item 1, Article V of this Treaty postulates: “Each Party undertakes not to develop, test or deploy ABM systems or components which are sea-based, air-based, space-based or mobile land-based.”

It is hard to overestimate the importance of this U.S.-Soviet Treaty today for it remains the only ratified and acting agreement in the area of strategic arms limitation.

THE PRESENCE of tested and deployed elements of space-based systems, even of limited scope, could considerably hinder the progress of negotiations on strategic arms limitations and limitations of nuclear weapons in general.

Such an unfortunate result would be inevitable. The introduction of a qualitatively new component in the strategic arsenal of one or both sides would confuse the existing assessments of strategic balances and bring up additional complications in the comparison of forces. The development of space-based anti-missile systems is likely to go in different ways in the two countries as has been true of the strategic arms race. Such differences would increase the asymmetries in the strategic potentials of our two countries—thus making comparisons even more difficult. These asymmetries could become increasingly significant in the face of deployment of potential anti-SBAMS systems and counter-systems.

After these systems were deployed, U.S.-Soviet strategic arms limitation and reduction agreements would be more complex and correspondingly more difficult to understand on the part of the public, which plays an increasingly important role in solving the problems of war and peace.

With regard to international political consequences the deployment of space-based systems cannot be ignored. They would inevitably become a serious obstacle for U.S.-Soviet cooperation in the peaceful uses of space. Yet the potential value of such cooperation is important from economic, scientific and technological points of view, because of the many mutually complementary characteristics of the

Soviet and U.S. space programs. Cooperation in this area could be a very positive factor, politically and psychologically, in improving U.S.-Soviet relations in general, and in strengthening the confidence between the peoples and the leaders of the two great powers.

THE POTENTIAL impact of a large-scale space-based anti-missile program on the strategic balance would be to substantially increase both the risk of a preemptive strike and the likelihood of wrong and fatal decisions in crises. Hence even if rough parity in strategic forces were preserved, strategic stability would be seriously undermined.

Deployment of strategic “defensive systems” would definitely trigger a chain reaction in the development of new weapon systems. That would confuse the strategic balance to an unprecedented degree and increase the uncertainty in political-military decision-making.

In view of the existing dialectical relationship between strategic offensive and defensive systems, even the possibility of building SBAMS would seriously undermine the possibility of future U.S.-Soviet (and perhaps multilateral) agreements on strategic arms limitation and reduction talks, and thus the prospects for strengthening strategic stability.

Abrogation of the ABM Treaty would in turn undoubtedly lessen chances for reaching mutually beneficial strategic arms limitation and reduction agreements in the near future. The stabilizing regime created by the 1972 ABM Treaty could be strengthened significantly by agreements on the non-deployment in space of any weapons and the non-use of force in space. These would include a ban on the use of force from space against the Earth, as well as a ban on anti-satellite weapons.

Vast resources would be required for construction of a space-based anti-missile system, to say nothing of the scientific and technological capital already devoted to this enterprise. These funds and efforts could be effectively diverted to large-scale international bilateral and national programs of a peaceful nature. If this were to happen, that part of U.S. industry which would have been employed to develop the space system could effectively be engaged in such peaceful projects.

It was the unanimous view of the Committee of Soviet Scientists that programs of cooperation in this field could substantially contribute to and expedite the solution of increasingly acute global problems such as economic development, energy, resources and ecology. They could also create a basis for successful space exploration by future generations of the Earth's inhabitants. □

**Political-Military Implications of Prospective American Space-Based Anti-Missile System*, report issued by the Committee of Soviet Scientists for Peace Against the Nuclear Threat (Moscow: 1983).

R. Sagdeev heads the Institute of Space Research of the Soviet Academy of Sciences. He serves as vice-chairman of the Committee of Soviet Scientists. A. Kokoshin is head of the political-military department in the Institute of U.S. and Canadian Studies of the Soviet Academy of Sciences and is vice-chairman of the Committee of Soviet Scientists. The Working Group included members of the Institutes of Space Research, of World Economy and International Relations, and of U.S. and Canadian Studies: A. Arbatov, A. Vasiliev, R. Nazirov, O. Prilutsky, R. Rodin and S. Rodionov.

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The fear of treaty violations by the Soviet Union and the United States underlines the need for effective mechanisms to clarify suspected breaches.

Charges of treaty violations

by Jozef Goldblat

A LLEGATIONS of breaches of arms control agreements have been made repeatedly in the past 10 years, and especially since 1980 when East-West Cold War rhetoric became particularly shrill. Significantly, these allegations coincided with the interruption or suspension of a series of important U.S.-Soviet negotiations.

But it was only in early 1984 that the United States and the Soviet Union decided to draw up and make public comprehensive lists of their complaints against each other.

A report sent by President Reagan to the Congress on January 23, 1984, lists seven cases of alleged Soviet non-compliance with obligations under arms control agreements.¹

- The Soviet Union maintains an "offensive" biological warfare program and capabilities and is involved in the production, transfer and use of toxins and other lethal chemical warfare agents used in Laos, Kampuchea and Afghanistan. It has therefore violated its legal obligations under the 1972 Biological Weapons Convention and customary international law as codified in the 1925 Geneva Protocol.

- The notification of the Soviet military maneuver "Zapad-81," which took place on September 4-12, 1981, was "inadequate." Moscow therefore violated its political commitment under the document on confidence-building measures included in the 1975 Final Act (Helsinki Declaration) of the Conference on Security and Co-operation in Europe.

- The Soviets are building, near Krasnoyarsk in Central Siberia, a large phased-array radar. This is "almost certainly" a violation of the Soviet legal obligations assumed under the 1972 ABM Treaty, which limits the location and orientation of such radars with a view to precluding a territorial anti-ballistic missile defense.

- The Soviets have engaged in encryption of missile test telemetry (radio signals sent from a missile to ground monitors) deliberately to impede verification. This practice constitutes a violation of the 1979 SALT II Treaty, under which the parties shall not deny telemetric information whenever such denial impedes verification. And while the Treaty has

not formally entered into force, the signatories are obligated under international law not to take action during the pre-ratification period, which would defeat the purpose of the unratified agreement. In 1981, after the United States had made clear its intention not to ratify the Treaty, the signatories assumed a "political" commitment, as distinct from a "legal" obligation to refrain from actions contrary to its provisions.

- The Soviets have tested a second new type of ICBM, the SS-X-25. While the evidence is "somewhat ambiguous," such testing is a "probable" violation of the Soviet political commitment to observe the SALT II Treaty, which limits each party to one new type of ICBM in order to constrain modernization and proliferation of more capable types.

The Salt II Treaty fails to indicate what kinds and amounts of information are needed to insure verification.

Even if Moscow's assertion that the SS-X-25 was not a prohibited new type of ICBM were accepted, it is still held that the Soviets acted contrary to a SALT II Treaty provision. This provision prohibits an ICBM of an existing type, equipped with a single reentry vehicle, to be flight-tested with a reentry vehicle the weight of which is less than 50 percent of the throw-weight of that ICBM. This is in order to bar the possibility that single-warhead ICBMs could be quickly converted to MIRVed systems. Encryption on this missile impeded verification by the United States.

- The Soviet Union has deployed the SS-16 ICBM. While the evidence is "somewhat ambiguous" and no definitive conclusion could be reached, activities at Plesetsk, a missile test range, are a "probable" violation of Moscow's legal obligation (prior to 1981) and of its political commitment (after 1981). The SALT II agreement included a provision not to deploy the SS-16, nor to produce the third stage and the reentry vehicle of that missile, so as to foreclose the possibility of converting land-based launchers of ballistic missiles other than ICBMs, into launchers for ICBMs.

- The Soviet Union has conducted nuclear tests with a yield in excess of the agreed threshold. While the evidence, again, is "ambiguous" and no definitive conclusion could be reached, the Soviet activities for a number of nuclear



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tests constitute a "likely" violation of the legal obligations under the 1974 Threshold Test Ban Treaty. This Treaty prohibits, as of March 31, 1976, performance of any underground nuclear weapon test having a yield higher than 150 kilotons. (The Treaty is not formally in force, but since neither party has indicated an intention not to ratify it, both the United States and the Soviet Union are obligated under international law to refrain from acts which would defeat its object and purpose.)

Moscow has characterized the U.S. allegations as lies. In particular, the Soviets have rejected the accusation that they had transferred to others, or had themselves used chemical weapons in Laos, Kampuchea and Afghanistan. Regarding the military maneuver, "Zapad-81," they claim to have provided in advance all information required under the 1975 Helsinki Declaration. The Soviets also stressed their government's strict observance of the nuclear arms limitation agreements, including the 1972 ABM Treaty and the 1979 SALT II Treaty. The charges against the Soviet

*Suspensions may have arisen
because the relevant treaties
have not entered into force.*

Union, they say, were aimed at diverting attention from U.S. violations of the arms control agreements.²

THE SOVIETS have their own allegations against the United States. At the end of January 1984, the Soviet Embassy in Washington transmitted to the Department of State an aide-memoire listing cases of alleged U.S. non-compliance with the obligations under arms control agreements:

- The United States is engaged in a strategic program of unprecedented dimensions with the avowed aim of achieving military superiority over the Soviet Union. The United States, which is responsible for the unilateral interruption of the talks on a nuclear test ban, on the Indian Ocean, on anti-satellite systems and others, has also blocked and wrecked the Geneva negotiations on nuclear arms.

Such activities clearly contradict the U.S.-Soviet accords stipulating that neither side shall strive for military superiority and that, in their mutual relations, both nations will be guided by the principle of equality and equal security. Nor is the U.S. position in line with the 1968 Non-Proliferation Treaty, under which the parties are obliged to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament.

- In refusing to ratify the 1979 SALT II Treaty, the United States has rendered impossible the development of mutually acceptable solutions with respect to long-range sea- and

land-based cruise missiles, as specified in the Protocol to the Treaty, in order to be free to deploy such missiles on a massive scale. This does not accord with the U.S. stated intention to refrain from acts undermining existing agreements on strategic arms.

- The United States has deployed Pershing II ballistic missiles and long-range, land-based cruise missiles in Western Europe. Since these missiles are capable of reaching targets on Soviet territory, the United States has violated the provision of the 1979 SALT II Treaty which prohibits circumvention of the Treaty through any other state or states, or in any other manner, as well as the undertaking not to assume international obligations conflicting with the Treaty. The deployment in Western Europe of nuclear weapons, which obviously complement the U.S. strategic offensive arsenal, is not in conformity with the U.S. commitment to refrain from actions undermining the SALT II Treaty.

- The United States has been using shelters to cover launchers of Minuteman II and Titan II intercontinental ballistic missiles. This practice is contrary to the provisions for effective verification contained in the 1972 SALT I Agreement. (The SALT I Agreement expired on October 3, 1977, but the United States and the Soviet Union formally stated that they intended to refrain from any actions incompatible with its provisions or with the goals of the ongoing talks on a new agreement.)

Of particular concern are shelters over silos for Minuteman II launchers which are being refitted. Since the refitted launchers do not differ significantly from Minuteman III launchers, one can make a "supposition" that it is MIRVed Minuteman III missiles that are actually deployed in the silos in question. If this is so, the evident U.S. failure to observe the verification provisions of the SALT I Agreement also constitutes a failure to respect one of the main obligations under the SALT II Treaty—the limitation on the number of MIRVed ICBMs.

- The U.S. intention to build two new types of ICBM—the MX and the Midgetman—does not conform with the task of limiting strategic arms, as reflected in the U.S.-Soviet agreements.

- The United States has constructed a large radar installation on Sheyma Island, using components tested for ABM purposes. It has built shelters over silos containing ABM missile launchers, and is developing mobile ABM radars and space-based ABM systems. The U.S. military also tests Minuteman I missiles to assure their capability to counter missiles, and develops multiple warheads for ABM missiles. These and other activities are clearly in conflict with the 1972 ABM Treaty.

- The United States is deploying—on the Atlantic and Pacific coasts as well as in the South—new large Pave Paws radars. Again, this runs counter to the ABM Treaty obligation not to deploy an ABM system for the defense of the whole country, nor to provide a base for such a defense.

- Deployment of large-scale ABM systems, a project which was formally announced by the United States in March 1983, would undermine the ABM Treaty.

• The U.S. government systematically violates the agreed principle of confidentiality of discussions in the U.S.-Soviet Standing Consultative Commission.

• There have been repeated instances of U.S. nuclear explosions exceeding the 150-kiloton yield limit fixed by the 1974 Threshold Test Ban Treaty.

• As a result of U.S. underground nuclear explosions, radioactive debris has been found outside U.S. territorial limits. This is a violation of the 1963 Partial Test Ban Treaty.

• Each year, the United States organizes military exercises in Europe on such an enormous scale that it is becoming increasingly difficult to distinguish them from actual deployment of armed forces for war purposes. Mere notification of such exercises does nothing to remove the danger.

DISMISSING the Soviet allegations as "groundless," Washington gave the following explanations to specific charges:

• The use of sheltered ICBM launchers: During the initial Minuteman launcher construction, as well as the silo upgrade program during the mid-1970s, environmental shelters were employed to protect construction at the launchers from the weather. The facts concerning these activities were provided to the Soviets and were also available to the public.

In response to Soviet expressions of concern, the shelters were modified and their use was discontinued after the completion of the Minuteman silo upgrade program in early 1979. In the case of the Titan II silo, a cover was used to protect it from the weather during repair work on damage due to an accident. It was specifically designed to avoid any impediment to national technical means of verification, and was removed promptly after the need for it ceased.

• The charge that by not ratifying the 1979 SALT II Treaty, the United States has not fulfilled the provisions of the Protocol to the Treaty concerning solutions for long-range sea- and land-based missiles: The SALT II Protocol would have expired on December 31, 1981, even if the Treaty had been ratified and had entered into force. The United States made it clear at the time the Treaty was signed that the Protocol would not be extended. The subsequent NATO decision to deploy land-based, longer-range intermediate nuclear force (INF) missiles in Europe was made in response to Soviet SS-20 deployments. The U.S. Administration remains willing to negotiate on all such systems, including ground-launched cruise missiles.

• The Sheyma Island and Pave Paws radars: The Sheyma Island installation in the Aleutians is for national technical means of verification. The Pave Paws radars are ballistic missile early-warning systems located on the periphery of the national territory and oriented outward, as specifically permitted by the 1972 ABM Treaty.

• The circumvention of the SALT II Treaty: The United States made it clear to the Soviet Union during the SALT II negotiations—and stated publicly following the signing of the Treaty—that the SALT II non-circumvention provision would not alter existing patterns of cooperation with

its allies or preclude transfer of systems and weapons technology. The only SALT II provision applying to longer-range INF systems was in the Protocol to the Treaty, which limited, until December 31, 1981, deployment of cruise missiles with a range in excess of 600 kilometers on the sea- or land-based launchers. But that provision expired in 1981. Pershing II and ground-launched cruise missiles (viewed as strategic by the Soviet Union) do not circumvent the SALT II Treaty, which defines land-based strategic ballistic missiles as those having a range of 5,500 kilometers or more. The U.S. INF systems do not fall into that category. Moreover, in signing the SALT II Treaty, the United States stated explicitly that any future limitations on U.S. theater systems would have to be accompanied by appropriate limits on Soviet theater systems like the SS-20.

• The yield limit of nuclear explosions: Since the effective date of the 1974 Threshold Test Ban Treaty and the 1976 Peaceful Nuclear Explosions Treaty the United States has conducted no nuclear tests with yields in excess of the 150-kiloton threshold fixed in these treaties.

• Conversion of Minuteman II into MIRVed Minuteman III: Minuteman II silos were not converted to Minuteman III launchers. The Soviet Union has been informed that any launchers of Minuteman II ICBMs converted to launchers of Minuteman III ICBMs would be made distinguishable on the basis of externally observable design features, as required by SALT II.

*Various scientific reports
have supported the suggestion
that "yellow rain"
is of natural origin.*

• Confidentiality of the Standing Consultative Commission (SCC): The United States continues to discharge its obligations and responsibilities properly under Commission regulations. The U.S. government is not making Commission proceedings public; items appearing in the press about the Commission or about subjects which may be under discussion there do not reflect a change in that policy.

• The Helsinki Declaration: The United States is in compliance with all the undertakings contained in the Helsinki Declaration, including its military activities. The United States and its allies give notice of all exercises which exceed the threshold of 25,000 troops established by the Declaration, and often of smaller-scale military maneuvers as a voluntary effort to strengthen mutual confidence.

• Radioactive fallout from nuclear tests: Both the United States and the Soviet Union have had some difficulty in totally containing all their underground nuclear tests. There

were a few problems in the past with the venting of radioactive debris from underground tests at the Nevada test site, but as more experience was gained in containment, venting from U.S. tests became even more rare. Over the past decade there has been only one incident of local and minor venting. Since 1976 the Soviet Union had not raised concerns about U.S. venting until the recent reference to it.

- Space-based ABM systems: The ABM Treaty does not prohibit research, and both sides have had research programs since the signing of the Treaty. Soviet ABM research and development efforts have been continuous and more extensive than those of the United States, whose program calls only for enhanced research in this area. As President Reagan stated in March 1983, U.S. activities will be consistent with treaty obligations.

RECENT ALLEGATIONS of breaches of arms control agreements fall roughly into two categories: those relating to the general spirit of the agreements, and those dealing with specific provisions.

Charges falling within the first category have come mainly from Moscow. The Soviet Union interpreted subjectively such controversial notions as military superiority versus equal security, or strategic versus nonstrategic weapons in the European context. It also presented its own understanding of the duties of states under signed but unratified agreements, including non-circumvention of treaty provisions. Failure to share Soviet perceptions of the goals pursued in the arms limitation exercise, however, can hardly be labelled a violation of treaty obligations.

Charges within the second category have been made by both the United States and the Soviet Union. Most of these are vague and conjectural. In some cases, they result from a lack of sufficiently precise definitions. For example, the complex language of the ABM Treaty is often equivocal as to what is actually prohibited. The SALT II Treaty, banning encryption of telemetry which would impede verification, fails to indicate what kinds and amounts of information are needed to insure verification.

In other instances, suspicions may have arisen because the relevant treaties have not entered into force. Thus, for example, the parties have accused each other of exceeding the 150-kiloton yield threshold for nuclear explosions set by the unratified Threshold Test Ban Treaty. But meanwhile, the exchange of data necessary to establish a correlation between explosion yields at specific sites and the seismic signals produced is being held up pending ratification.

The parties themselves had in fact recognized that predicting precise yields of nuclear explosions was associated with uncertainties. Upon signing the Threshold Treaty they reached an understanding that one or two breaches per year would not be considered a violation. Equally, had the SALT II Treaty formally entered into force, there most probably would have been fewer problems regarding compliance, because the envisaged regular and obligatory exchange of data on strategic arms would have facilitated both uniform interpretation and verification of the Treaty provisions.

In at least two cases, controversies which were practically resolved have been dug out, it would appear, only to inflate the list of grievances. For example, both powers decided years ago to consider sporadic radioactive leakages spreading outside their territories as mere "technical" violations. Also, the placement of shelters over ICBM silos was discussed as early as the mid-1970s, at which time the matter appeared to have been adequately explained.

Most of the remaining charges concern issues of relatively minor military significance. For example, radar constructions, whatever their size, cannot render more effective the existing systems of ballistic missile defense (that is, those subject to limitation under the ABM Treaty), which are generally considered to be patently inadequate for preventing nuclear warheads from reaching the target. Nor is it likely that an "inadequate" prior notification of a military exercise could affect the security of other states. Intentions, whether expressed or presumed, to deploy new weapon systems, may sound ominous, but they cannot be censured as breaches of contracted commitments.

The most serious charges concern Soviet use of chemical and biological weapons, and the testing and deployment, by both the United States and the Soviet Union, of strategic missiles prohibited by the treaties. But regarding the first charge, no fresh evidence was provided to invalidate the statement, made in 1982 by a group of U.N. experts, that the allegations had not been proven. And since that time, various scientific reports have supported the suggestion that the phenomenon of "yellow rain," the centerpiece of U.S. accusations, is of natural origin.

Regarding the second charge, the U.S. allegations were admittedly based on "somewhat ambiguous" evidence, while the Soviet allegation was based on a mere "supposition." One wonders how assertions challenging the good faith of governments, and therefore fraught with grave political consequences, can be made so lightly and so loosely.

That the consultative bodies provided for in the arms control treaties, such as the Standing Consultative Commission, had not been exhaustively used testifies to the propagandistic nature of both U.S. and Soviet recriminations.

Agreements that have no provision for verification facilitate unsubstantiated charges. But even with the most elaborate safeguards against cheating, there will always be problems with the implementation of treaties, especially those dealing with arms control. This does not mean that the existing treaties should be scrapped, or that efforts to reach new agreements should be abandoned. But if there is to be progress in arms control negotiations, effective mechanisms to clarify suspicions about compliance and to protect parties against ill-considered allegations of violations are indispensable. □

1. U.S. Information Service, Document Foreign Policy EUR-114 (Jan. 23, 1984).

2. Pravda (Feb. 3, 1983).

3. Pravda (Jan. 30, 1984).

4. U.S. Information Service, Document Foreign Policy EUR-116 and 117 (Jan. 30, 1984).

*Arms buildups do not stimulate economic expansion
but, rather, tighten credit markets and threaten to reignite inflation.*

The military: shortchanging the economy

by Robert W. DeGrasse, Jr.

POLITICIANS have cited the economic benefits of military spending ever since World War II jolted the nation out of the Great Depression. Defense programs, it is argued, create jobs, boost the economy and result in technological spinoffs. The Reagan Administration also has stressed the claim that military spending creates jobs.

Recently the Council on Economic Priorities has closely examined these claims and has found that a large, rapid arms increase could induce serious economic distortions and long-range damage. Comparing 17 advanced industrial nations, we found that those devoting large portions of gross domestic product to arms typically had weakening economies, decreasing technological progress and spreading industrial lethargy associated with low investment rates. We also found that military spending is not the best way to solve our unemployment problem.

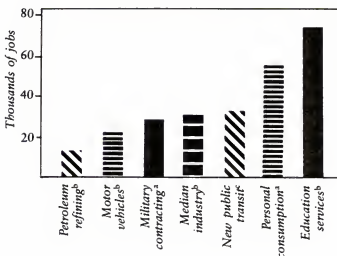
Pentagon officials correctly point out that cuts in military spending mean job cuts in the short run. The Council study, however, shows that compared to other uses of the same money, military spending is one of the least effective ways to quickly stimulate job creation, especially sorely needed blue collar jobs. Extrapolations from U.S. Labor Department data show that:

- About 28,000 jobs are created for every billion dollars spent on military procurement (Figure 1).
- The same billion dollars would create 32,000 jobs if spent for public transit, 57,000 jobs if spent for personal consumption or 71,000 jobs if spent for education.

While in the long run the employment induced by military production workers spending their higher salaries will even out these differences, the immediate impact of arms spending does not help those who most need assistance.

Who gets the jobs? Weapons builders employ mainly the highly skilled, a group whose 3.7 percent unemployment rate at the height of the recent recession was the lowest of any occupational category. At the same time, blue collar workers, who receive less employment from arms producers than other manufacturers, had a 20 percent unemployment rate. Eleven of the 15 principal military-oriented manufac-

Figure 1. Jobs created per billion dollars of final demand
Direct & Indirect
(Constant 1981 dollars)



Sources:

^a Marion Anderson, Jeb Brugmann and George Erickcek, "The Price of the Pentagon: The Industrial and Commercial Impact of the 1981 Military Budget" (Lansing, Michigan: Employment Research Associates, 1982).

^b U.S. Department of Labor, Bureau of Labor Statistics, "Employment Matrix for 1972 in 1972 dollars," unpublished. Inflated to 1981 dollars using appropriate implicit price deflator from *Economic Report of the President* (Washington, D.C.: U.S. Government Printing Office, Feb. 1983), pp. 166-167.

^c U.S. Department of Labor, Bureau of Labor Statistics, phone conversation with Karen Horowitz.

turing industries employ a significantly lower portion of production workers than the average U.S. manufacturing industry. Four of the five top military industries employ significantly more professional and technical workers than the national average (Figure 2).

The U.S. standard of living has been declining relative to other industrial nations since the Vietnam War years, as manufacturing industries have become less competitive internationally.

Comparative data over two decades (1960-1980) from 17 non-communist, advanced industrial nations indicate that nations which have devoted a larger share of output to civilian investment have experienced faster overall economic growth and, prior to the energy crisis, higher productivity growth as well. Greater civilian investment also coincided with higher employment. Conversely, the larger the military's demand for resources, both financial and human, the poorer a nation's economic performance. Indeed, of the



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Figure 2. Percentage of work force in each occupational category, 1980

Occupation	Aircraft & parts	Communications equipment	Guided missiles	Ordnance	Ship building & repair	All manufacturing
Professional & technical	25.4	32.3	55.7	15.2	7.0	9.1
Engineers	11.5	15.0	31.1	5.1	1.8	2.9
Managers	7.4	7.3	7.2	5.3	3.1	5.9
Sales	.8	.7	.2	.4	.4	2.2
Clerical	13.9	15.7	12.3	10.9	7.3	11.3
Craft	21.3	12.4	10.8	22.5	40.9	18.5
Operatives	27.3	27.3	11.2	33.5	31.6	43.4
Service	2.0	1.5	2.1	5.0	1.5	2.0
Laborers	2.0	2.9	.6	7.3	8.3	7.7

Source: U.S. Department of Labor, Bureau of Labor Statistics, "Employment by Industry and Occupation, 1980 and Projected 1990 Alternatives," unpublished data.

17 countries studied the United States had the lowest level of civilian investment and productivity growth, while bearing the heaviest military burden (Figure 3).

Military spending, however, is not the only reason for poorer performance. The 1973 oil crisis forced many manufacturers to invest heavily in new, energy-efficient plant and machinery. Countries such as the United States with old, inefficient operations had relatively greater replacement costs. Economic growth was also related to industrial maturity. The less developed industrial nations enjoyed higher rates of investment and faster gains in economic and productivity growth (see Box A).

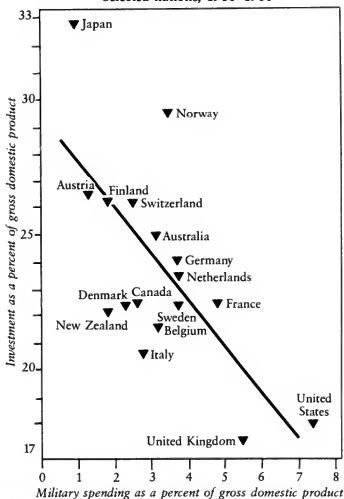
Supporters of higher Pentagon budgets argue that military spending directly benefits commercial technology. And it is true that the Pentagon has influenced the course and content of U.S. technological development. Its research, development and procurement projects employed roughly 30 percent of the nation's engineers and scientists during the 1960s, about 20 percent during the 1970s. The percentages are significantly higher for fields directly related to aerospace and electronics. For example, at least 60 percent of aeronautical engineers and more than 35 percent of electronics engineers worked primarily on national defense in 1978, when the share of gross national product devoted to the military was at its lowest point since 1950 (Figure 4).

Despite the substantial influence implied by those percentages, strong evidence suggests that military spending has stunted U.S. technological growth in commercial markets. The Council examined the electronics, aircraft and machine tool industries, assuming that if commercial industries benefit from military research, then firms serving the Pentagon should have maintained or expanded their overall market shares. In each case the contrary proved true. Japanese industries have significantly penetrated markets for electronic memory chips and for computer-controlled machine tools. European firms have expanded their share of the machine tool market. And Airbus Industrie, a European consortium, is challenging U.S. dominance in the commercial airline market. The Council's case study of the

electronics industry shows that Pentagon contracts, once a commercial stimulus, now inhibit commercial success (see Box B).

To many who recall the World War II and Korean War eras, Reagan Administration plans for military expansion

Figure 3. Investment vs. military spending
Selected nations, 1960-1980



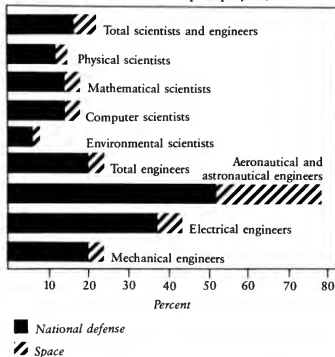
along with economic growth may not seem mutually exclusive. Yet historical comparisons suggest that the proposed \$1.6 trillion arms buildup will have serious adverse effects on the U.S. economy.

The planned military expansion is the largest in U.S. peacetime history, only somewhat smaller than that engendered by the Vietnam War. Between fiscal years 1982 and 1985 military expenditures are slated to grow 32.4 percent in constant dollars. During a comparable three-year period of the Vietnam War (fiscal years 1965 to 1968), the military budget rose 42.7 percent.

While the buildup planned by the Reagan Administration is less dramatic than that of the Vietnam era, there is little reason to believe that its economic impact will be lighter or comparatively beneficial. The Vietnam conflict required fewer new resources than did the Korean War, yet the economic problems it caused were greater, triggering the series of price and wage increases that still plagues the economy. Unlike the Korean, the Vietnam War was financed by deficit spending. Those deficits occurred when the economy was functioning at peak capacity. And there were no wartime economic controls to dampen inflation.

Measured as a share of gross national product, the projected Reagan Administration deficits will exceed those of the Vietnam War peak in each of the next three years (Figure 5). The fiscal stimulus of deficit spending did not hurt the economy during the just past recession, but during the current recovery massive deficits could fuel inflation or provoke extreme competition in the credit markets, depending on the nation's monetary policy.

Figure 4. Scientists and engineers working primarily on national defense and space projects, 1978



Source: U.S. National Science Foundation, "Characteristics of Experienced Scientists and Engineers, 1978, Detailed Statistical Tables," (Washington, D.C.: U.S. Government Printing Office, 1978), Table B-13.

Since the government does not plan peacetime wage and price controls, the Federal Reserve Board can be expected to control inflationary pressure by slowing growth of the money supply. With money tight, the vast government borrowing now foreseen would push interest rates ever higher, choking off recovery.

Military spending would be largely responsible for such dangerous deficits. After subtracting such self-funding programs as social security from the federal budget and adding all military-related costs to the national defense function, we find that nearly 49 percent of the federal government's

A. Civilian government and labor costs compared

The Council on Economic Priorities' analysis indicates that:

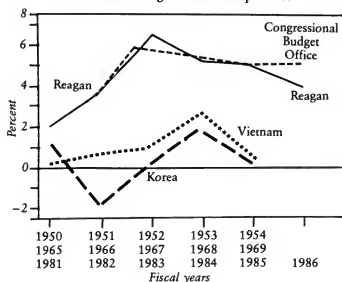
- Government spending in the civil sector does not explain why the United States performed poorly. Among 17 nations studied the United States ranked thirteenth in the share of gross domestic product spent on civilian government consumption. It ranked thirteenth among 14 nations in the share of gross domestic product transferred from one income group to another through the government.
- Labor costs did not seem to play a significant role in comparative economic performance. Nations with higher labor costs tended to offset this disadvantage with higher rates of output per employee. Manufacturing labor costs also have converged over the past 20 years. By 1980 the United States ranked fifth among 10 nations in compensation for manufacturing production workers.
- Labor force growth does not explain the decrease in manufacturing productivity during the 1970s either. The U.S. manufacturing labor force actually grew more slowly after 1973 than during the 1960s.

B. Pentagon's effect on semiconductor development

While military programs contributed significantly to the early development of the electronics industry, the costs now seem to outweigh the benefits:

- The end products developed for military use, such as missile guidance systems and electronic warfare devices, have few commercial applications.
- Military research and development have a mixed record in supporting projects that have led to significant innovations. It is hard for military personnel to judge the most promising projects. And the Pentagon tends to support larger, established firms rather than the newer, smaller firms that have proved more innovative.
- Military subsidies for new products are increasingly unnecessary. As the cost of electronic circuits has rapidly fallen, massive industrial and commercial markets have overshadowed the military's role as "creative first user."
- The Pentagon's current attempts to guide the development of semiconductor and machine tool technology raise serious economic and political issues. Military subsidies for semiconductor technology may hinder its development rather than nurture new products. Defense Department programs designed to increase factory automation are financing a narrow approach without input from the workers who will be affected.

Figure 5. Unified budget deficits as a share of gross national product



general funds were spent on the military in fiscal 1981 (Figure 6). In fiscal 1986 the Pentagon is expected to use more than 56 percent of the government's general funds.

Inflation escalators and delays in delivering military products also could add to inflation in some industrial sectors. That likelihood is considerable since between fiscal 1982 and 1985 over 55 percent of the growth in military outlays will be for procurement and research and development, both infamous for costly backlogs. By comparison, procure-

ment and research and development accounted for but 40 percent of the growth during the Vietnam War, and 43 percent during the Korean War. During past buildups, a larger share of the defense budget increase paid for soldiers and spare parts than in the current situation.

Commerce Department analysts have predicted that the current buildup might require such a large portion of the output of advanced industries as to slow export of high technology goods. Further, the value of unfilled orders for military products has risen until it is now greater (in constant dollars) than at the height of the Vietnam War. And unfortunately, as Pentagon demands mount, the ability to deliver goods on time may decrease because of an inadequate supply of skilled labor, such as engineers and machinists. Thus, an economic simulation by Data Resources, Inc. suggests that the present buildup could result in bottlenecks throughout the economy by 1985. Production bottlenecks and skilled labor shortages time and again have inflated the costs of products purchased by the Pentagon. Indeed, during the past five years, inflation in the cost of military equipment has been substantially higher than in the economy as a whole.

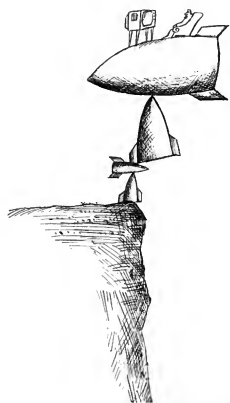
The United States can afford whatever is needed to provide for its security. However, a diversion of government resources to the military on the scale planned by the Reagan Administration will seriously weaken the nation's ability to meet the challenges of unemployment, foreign market losses, diminishing technological leadership and industrial obsolescence. The question we must ask is: Does the military power created by the buildup justify the economic price we will pay for it? □

Figure 6. Total military spending budget, fiscal years 1981 and 1986 (millions of dollars)

Agency or program	1981 outlays	Percent of federal funds	1986 outlays	Percent of federal funds
National defense function	\$159,765	33.6	\$310,550	42.1
Military-related programs				
Veterans' benefits	22,988	4.8	27,808	3.8
Foreign military assistance	793	.2	950**	.1
National Aeronautics and Space Admin.	1,084	.2	1,560**	.2
Coast Guard	341	.1	500**	*
Merchant Marine	13	*	10	*
Aid to federally impacted areas	172	*	200	*
Interest payments on military-related debt	45,565	9.6	75,000	10.2
Subtotal of additions	70,956	14.9	106,028	14.4
Total military budget	\$230,721	48.6	\$416,578	56.5
Total federal funds	\$475,171	100.0	\$737,865	100.0

*Less than .1 percent.

**Estimates



Paul Valeriy, West Germany

Books

Jonathan Alford reviews

Conventional Deterrence
by John J. Mearsheimer
Cornell University Press
296 pages, \$29.50

There is much more to be said about "conventional deterrence" than is said in this book, and much that is said in this book is at best contentious and at worst wrong-headed. Nevertheless the author is to be congratulated for writing provocatively about a subject which is too rarely addressed, and for grappling with an extremely important question: how do conventional forces deter? What psychological mechanism acts on the mind of a potential conventional aggressor? Nuclear deterrence has been the subject of intense intellectual curiosity and much speculation for more than 30 years. Conventional deterrence (or, as I would prefer, defense) has not.

The thesis that Mearsheimer propounds is that a potential aggressor has a choice between three alternative "conventional" strategies: attrition; limited (territorial) aims; and *blitzkrieg*. His first general conclusion is that the defender will find it easier to deter an opponent who can only contemplate embarking on a war of attrition. An opponent who can choose a "limited aims" or a *blitzkrieg* strategy will be much harder to deter. His second conclusion, based on an examination of Soviet capability and the forces and technology available to NATO (especially precision-guided munitions—PGMs) is that the Soviet forces do certainly contemplate *blitzkrieg*, realize the extraordinary difficulty of the undertaking in the face of NATO defenses, and are very likely to be deterred. Fundamental to that second conclusion is his argument that the presence of large numbers of precision-guided munitions on the European bat-

tlefield would inhibit the deep armored penetration essential for a *blitzkrieg* to succeed.

To bolster his thesis the author examines in depth a few deterrence successes and failures; others are treated in a very cursory manner indeed or ignored altogether. His historical analysis of the "Phony War" in the West (1939–1940) and the German decision to launch a *blitzkrieg* in May 1940 is interesting; his use of sources seems quite thorough and his conclusion broadly correct: namely that the Allies were deterred from attacking because they saw only the possibility of a war of attrition and that Hitler was (ultimately) not deterred because a *blitzkrieg* seemed to offer considerable prospects of dramatic (even decisive) success. His treatment of the Arab-Israeli conflicts is less thorough but still quite convincing. Once Israel acquired the capability to conduct a *blitzkrieg* attack, the Arabs (in 1956 and 1967) could not deter Israel. In 1973, an Arab strategy of limited territorial aims was not deterred by Israel.

It is when Mearsheimer examines NATO that his analysis is most suspect. While it is certainly true that not many of us know much about modern war, the two chapters dealing with the central front and precision-guided munitions have many of the kinds of weaknesses that one might expect from a young academic writing about things which seem to be quite outside his experience. Anyone can speculate happily about nuclear theology and not be proved wrong. You cannot practice nuclear war but you can practice conventional defense—you can fire weapons at targets, and you can hold fairly realistic exercises.

I do not disagree with the author's conclusion; I also believe that precision-guided munitions tend to enhance the capabilities of the defender over those of the attacker. Where I am at odds with Mearsheimer is in many of his overly simplistic tactical judgments. In some cases he is simply wrong as to fact. All too often his statements are unqualified or run in the face of military common sense. Here are some ex-

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by Lorin Peterson

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"That was very naughty, Sir Pincus. You're not supposed to use gunpowder—it's only a deterrent."

amples: "inexpensive tanks are very vulnerable"; "placing special armor on the IFV [infantry fighting vehicle] would raise the price of an IFV to a level commensurate with the cost of a tank"; "no PGM can penetrate it [Chobham armor]"; "aircraft will simply not survive over a battlefield laden with SAMs [surface-to-air missiles] and air defence guns" (tell that to the Israelis!); and "an infantry squad can now conduct combat operations without dismounting" (what operations?).

I have checked one or two of Mearsheimer's references. In one case he quotes Richard Ogorkiewicz in the above statement about the penetration of Chobham armor. Ogorkiewicz actually says, "clearly missiles will destroy tanks with any kind of armor. However, large missiles are no longer portable." That is a very different statement.

Finally, Mearsheimer is weak in his understanding of how different arms cooperate. It is almost as if he has never bothered to speak to soldiers of any army. For example, his contention that "the amount of time expended [on artillery exchanges] depends on whether the offense uses towed or self-propelled artillery" is untrue. The time into action of towed artillery with well-trained crews is hardly any longer than for self-propelled, and the rate of fire is the same for both, except with automatic loading. For "artillery exchanges" (counter bombardment) what takes

time is accurate surveying and target acquisition. He never mentions the anti-armor helicopter and its role in defense. His understanding of what infantry do on the battlefield is tenuous indeed.

Yet for all these quibbles, I would not want the book to go unread for it does break new ground. Nor would I want the author to be discouraged. It could have been a much better book if he had bothered to have the text read by someone with military experience. There is no reason to suppose that a young scholar should understand military operations, tactics and technology, but there is no excuse under those circumstances for not taking advice. I hope he will write more but better and more circumspectly. He wounds an interesting thesis with poor supporting evidence. □

Colonel Jonathan Alford is deputy director of the International Institute for Strategic Studies in London (WC2E 7NQ). He was in the British Army for 26 years, six of which he spent as an instructor in tactics.

Mark R. Beissinger reviews

Industrial Innovation in the Soviet Union

edited by R. Amann and J.M. Cooper
Yale University Press
526 pages, \$66.00

Western perceptions of Soviet scientific achievements have tended to vacillate between awe and irreverence. In the post-Sputnik phase, the spurious image of Soviet science on the march not only gave Pentagon planners ammo in their struggle to increase defense research budgets, but also brought about major governmental support for U.S. civilian science and education, lest the United States lose out in the science race. More recently, the tendency to judge the Soviet Union as a scientific "paper bear" often has been accompanied by a complacency toward the benefits which the Soviets have at times reaped from unbridled technology transfer from West to East.

Both the awestruck and the irreverent would do well to consult *Industrial Innovation in the Soviet Union*, part of a 20-year research effort by a group of engineers, economists and political scientists from the Centre for Russian and East European Studies at the University of Birmingham whose purpose has been to develop an empirically-based understanding of Soviet science and technology. Though this volume was planned as a companion volume to the group's 1977 publication, *The Technological Level of Soviet Industry*, it has every right to stand on its own as a serious scholarly work of interest to the expert as well as to those concerned with the scientific and military aspects of East-West competition.

It is well known that in most areas of technology the Soviet Union has lagged considerably behind the West—a gap which in recent years has been widening instead of narrowing. The Birmingham Group has few qualms with the traditional explanation of why this should be so; the Soviet system of centralized economic planning, with its narrow emphasis upon plan fulfillment, its fixed prices, its incessant material shortages, and its characteristic bureaucratic barriers, has stifled much of the initiative and incentive necessary for technological innovation. But this group's earlier work uncovered a number of variations in the level of development of Soviet technologies. As Ronald

Amann asserts in his introduction to this volume, "patches of success" within both the defense and civilian sectors co-exist with "examples of remarkable stagnation and abject failure." Amann attacks the oversimplified notion that central planning is inimical to all technological innovation because this explanation fails to "take account of other major factors which affect innovative performance and which, in particular, account for technological variations between different branches of industry which are subject to the same economic planning mechanism."

Industrial Innovation aims to explain these variations, and Amann suggests that the answer lies in what Charles Lindblom has called the weak fingers and the strong thumbs of a centrally-planned system. The centralization of economic decision-making characteristic of Soviet planning at once both stifles and stimulates technological innovation, depending largely on political intervention from above, which can play a crucial role in channeling scarce resources toward priority projects. Several well-documented cases from this volume illustrate this phenomenon.

- M.J. Berry's study of the machine-tool industry (a critical sector for the entire Soviet engineering community) demonstrates that the "lack of flexibility in the system," the "dominant role of the producer," and the "low level of supplier industries," have had a negative effect upon technological achievement in this field. At the same time, Berry argues, some of the successes which can be found in the Soviet machine-tool industry (for example, the widespread production of numerically-controlled machine-tools) can also be traced to aspects of the planning system—in particular, "the ability to switch resources rapidly into new projects when their viability has become established."

- Ronald Amann's historical and institutional analysis of the Soviet chemical industry shows as well the important role which political intervention has played in defining the level of Soviet technological achievement in a branch

of industry whose fortunes have waxed and waned depending on the shifting priorities of successive Soviet leaderships.

Many readers will find the chapter by David Holloway on innovation in the defense sector of particular interest. Holloway convincingly argues that Soviet military research and development is not as isolated as is usually thought from the systemic problems of other branches of Soviet industry. At the same time, he asserts, many of the problems associated with the civilian research and development process are overcome in the defense sector precisely because of the higher priority which defense research receives from the Soviet leadership. As Holloway concludes, "It seems more natural to speak of obstacles being overcome than to point to a strong innovative dynamic in the defense industry itself." Holloway supplements this analysis with an additional chapter comparing two cases of Soviet defense procurement (battle tanks and ICBMs), demonstrating the bankruptcy of simplified stereotypes of the arms race dynamic. Technological innovations in the Soviet military, he suggests, have originated from discoveries within the

Soviet military research and development community (for example, the T-34 tank) as well as from political and military pressure from above generated by foreign technological achievements (for instance, the development of the first Soviet atomic bomb). Holloway concludes that while "military doctrine and the design and development process impose their own pattern on Soviet weapons innovation and diffusion," it is also true that "in specific cases international competition may be a decisive factor in weapons innovation."

Another author in this collection, Z.A. Siemaszko, warns the reader not to judge Soviet technological capabilities solely on the basis of the sophistication of Soviet equipment. In his study of the Soviet control instruments industry, a branch of technology with clear military applications, Siemaszko notes the "systematic bias against innovation" inherent in Soviet institutions in this field. But he reminds the reader in a postscript that the Soviet Union at times has been able to attain "a superior result to that obtained in the West . . . with highly retarded control technology, but with better mainstream engineering design." In support of this assertion, he



Richard Cline, United States

cites two cases—Soviet MiG-25 military aircraft and the Soviet electric power industry—in which control instrumentation has been relatively backwards, but for which, in the opinion of Western experts, the overall performance of the equipment has matched or surpassed its Western equivalents.

A number of essays in the book deal with organizational aspects of the Soviet research and development process, including studies of the application of the Group Technology concept to Soviet industry (John Grayson), attempts to apply computer technology to managerial and industrial processes (Martin Cave), and institutional changes in the management of science during the Brezhnev years (Julian Cooper). Philip Hanson's contribution on the issue of technology transfer to the Soviet Union points both to the substantial problems the Soviets have had in absorbing Western technology as well as to the significant economic impact such technology transfers have had on some branches of industry in the country, in particular, the chemical, computer, shipping, and automobile industries.

The major flaw in the book, besides its cumbersome size, is the absence of a suitable conclusion. Those familiar with the Soviet innovation process will find Julian Cooper's concluding essay on recent reforms in Soviet research and development management too optimistic, particularly in light of the considerable evidence which he and his colleagues have assembled on the inherent irrationalities built into the Soviet centrally planned system. But despite this drawback, *Industrial Innovation* remains an indispensable sourcebook for those who wish to depart from the realm of speculation about Soviet scientific achievements and to enter the realm of Soviet reality. □

Mark Beissinger is an assistant professor of government and a fellow of the Russian Research Center at Harvard University in Cambridge, Massachusetts (02138). His chapter, "The Political Elite," appeared in *The Soviet Union Today*, published by the Bulletin in 1983.

John E. Mack reviews

Against the State of Nuclear Terror
by Joel Kovel
Pan Books Ltd.
240 pages, £3.95

Joel Kovel's book is a courageous examination of "the great reality of nuclear death" which has reduced our civilization to its present state of terror.

Seemingly written in the heat of Kovel's outrage that fellow human beings are preparing to destroy the world, it provides at the same time a penetrating analysis of the roots of the nuclear crisis and specific steps individuals can take to end it. *Against the State of Nuclear Terror* should be read by everyone who is not willing to live perpetually on the brink of global murder/suicide and who is looking for a way to arrest our drift toward oblivion.

Kovel shares with his readers the emotional experiences and the turning points which led him from impotent rage to full engagement with the nuclear problem. This sharing is of special value for those who are finding their way toward a deeper involvement in the nuclear dilemma:

I remember quite clearly feeling something snap inside when I read of Caspar Weinberger's announcement that the U.S. was going ahead with the assembly of the neutron bomb. That was the moment I consciously decided to wake up and devote myself to contending with the beast; and I'm sure that some similar moment has taken place for millions of others.

The author is a psychoanalyst at Albert Einstein College of Medicine, but he does not allow his examination of the nuclear dilemma to rest on professional insight alone. His book is unique in its consideration of both political-cultural and psychological forces in the genesis and perpetuation of the arms race, and offers as well a sophisticated analysis of how in-

dividual and collective determinants interact.

Kovel focuses responsibility for the present condition of nuclear terror on the mentality of the modern technocratic state. In the name of protection and security the nuclear state dominates and enslaves countless millions of human beings, while, like a giant Molech, it feeds its limitless military appetite, draining resources from all other human needs. Kovel demonstrates that in our powerlessness and terror we are continuously the victims of the nuclear state.

Although a pattern of interaction has become established in the escalating arms race, Kovel sees the principal source of the crisis in Western imperialism, "with its reliance on ultimate technological force to protect its power and its use of nuclear terror to keep its own population under control." Not everyone will agree with this, but Kovel's arguments need to be heard.

The technological monster which the West has created requires a formidable enemy, and the Soviet Union has filled this role. Yet, while the Soviet Union appears to threaten the West, Kovel argues that Soviet military capability is greatly exaggerated by Western leaders: "Whenever the Soviet military machine is looked at closely it always begins to more resemble a dinosaur than a *Wehrmacht* bristling with ardor to invade and subjugate." The portrayal of the Soviet Union as a demon, and willfully ignoring its realities and vulnerabilities are used in the West to justify militarism and nuclear adventurism.

Kovel identifies clearly the deep fear and hatred which lie at the root of the nuclear competition—and the mutually reinforcing paranoia that is the inevitable result. But he is careful not to blame individuals. Members of the ruling elite are themselves unaware of the forces they embody. They are not even aware of lying.

Kovel is at his best in his discussion of the impact of technocracy on our society and our minds. Dwight Eisen-

First reviewers welcome—

"A mine of information."

This clear, dispassionate account of the nuclear arsenal that exists today, by an M.I.T. physicist...is developed in more detail and with less emotion than in Jonathan Schell's *The Fate of the Earth*."

—*The Kirkus Reviews*

The New York Times Book Review says:

"...Kosta Tsipis has recently been heard on Capitol Hill lobbying against Reagan Administration plans to develop space weapons. In *Arsenal*, he takes his case to the people, arguing that laser beam and other directed-energy weapons, while attractive in theory, are not practicable...Writing from a scientific, not a political, perspective and drawing on unclassified government documents, Mr. Tsipis addresses vital questions: How, theoretically, does the hardware work? What are its vulnerabilities? Will it work in

practice? Does it enhance American security? Mr. Tsipis' assessments are unsettling; he shows each weapons system to be seriously flawed.

—*Sue M. Halpern*

"A remarkable tour de force

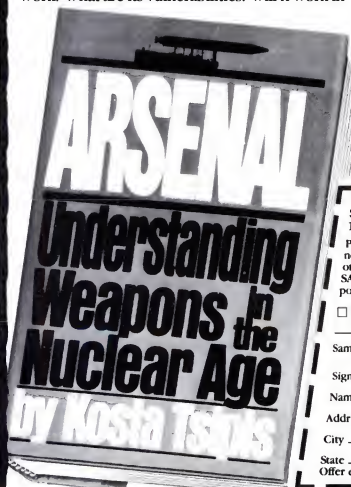
of clear writing about unusually difficult scientific matters...This must certainly be among the most accurate, detailed descriptions yet written of the physical and social effects of a nuclear war in which all state-of-the-art weapons are used...Sophisticated, clear science writing."

—*Publishers Weekly*

"Tsipis should be congratulated

for writing such a coherent summary of the technical issues. *Arsenal* is a useful book for understanding the physics of strategic systems."

—*William Rosenau, Boston Globe*



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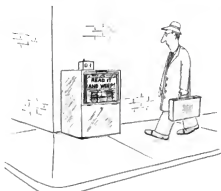
hower warned in his 1961 Farewell Address (reprinted in this book) of "the danger that public policy could itself become the captive of a scientific-technological elite." Faith in the technological "miracle" of nuclear defense is nothing more than an extension of the delusion that security can be derived from the technology that produces ever more menacing devices.

Nuclear technology, while vastly increasing the power to destroy, makes easier the removal of human agency and responsibility from the wielding of that power. At the same time technical euphemisms make mass killing far easier and much more likely. Becoming ever more distant from its victims through sophisticated technologies, and from the human emotions which might permit identification with those victims, the nuclear state is removing the barriers to committing mass murder on an incomprehensible scale.

As Kovel demonstrates, the technocratic state and the individual self intersect in embracing the religion of technology: "Modern man (again the masculine term applies to what has happened to the species here) worships technology. . . . He is swaddled in it from the day of birth. It becomes his alter mother, a cocoon that carries him passively through the world."

Through modern technology we have extended the Cartesian dualism in which the "I" is "wholly distinct from the body," to the point where we have come close to brutalizing all of creation. Kovel shows how closely men associate nature with femaleness and seek to subjugate it with machines. He realizes that "to undo the warrior mentality means accepting the female side" of our humanness.

Split off from nature, the self has itself become mechanized. Nuclear devices become the ultimate means of domination, waiting to explode in "an orgy of technological aggrandizement." Harnessing technology to dominate and enslave many millions of human beings while depriving countless millions of others of desperately needed resources, the techno-



Thomas Cheney, United States

cratic state is, in Kovel's words, "human power that has become inhuman and returns to us as stranger."

Kovel suggests we have been co-opted by the technocratic state through a kind of pact with Satan in which we surrender to the state our capacity for feeling and initiative in return for security and the promise of sharing in the power:

We, too, identify with the bomb: it enters our body image and invests it with its incomprehensible power. . . . We do not become one with the bomb through any particular enhancement of power, but only through an inchoate diffusion of grandiosity. It cannot be an extension of the hand, or phallus, or eye, or, as in the case of the computer, of brain—it must always remain an "it," an all-pervasive, all-transforming, all-destroying, nihilistic thing.

At the same time, however, this identification with nuclear weapons, and with the state that produces and deploys them, brings about a fragmentation of self and the destruction thereby of the experience of human continuity, which depends on an intact sense of self: "Identification with the power of the bomb links us with the state at the point of greatest grandiosity, not the grandeur of achievement and community, but a formless isolation quite literally, an atomization of the self." With this fragmentation comes a spiritual impoverishment: "In the psychology of the massed individual, the indi-

vidual ego swells, a false self covering the nakedness of the spirit within."

What can human beings do to recapture responsibility for our lives and some possibility of a future? "There is no end of honorable work," Kovel says. We can demystify the bomb, ridicule civil defense, and penetrate the paranoia of the Cold War, examining Soviet realities and perspectives. We may "criticize media complicity relentlessly" and "censure the culture of violence and technocracy." Above all, the people can "withhold consent from the order which may well exterminate them."

The primary mode of anti-nuclear organization, he suggests, is the small democratically-run local affinity group which links the nuclear issue to other emerging social values such as feminism, nonviolence and concern for the physical environment. Affinity groups must merge into broader "councils" in order to mobilize support in addressing larger issues. The state has become the organizer of death, but it is not too late for citizens to join together to protect and preserve life.

According to Kovel, the initiatives, including unilateral steps toward disarmament, must come from the West. Fear of the state exists in the West as well as in the Eastern bloc but, with courage, it is possible here to oppose destructive trends in our society. As Kovel stresses, to achieve the necessary social transformations will take a great deal of work. We are dealing with deep-seated philosophical, psychological and political assumptive patterns which resist change, not to mention the fact that by current estimate approximately six million careers in the United States alone are bound up with the military.

But there seems to be no choices. The arms race is killing both societies: "We have here the spectacle of one adversary proposing to another that they both drink poison in the expectation that he will be the one to die more slowly."

Kovel's extraordinary book offers a liberating alternative, a way out,

through determined action, of the tangle of lies and terror in which we are so dangerously trapped. Through responsible action we may also begin to end the spiritual impoverishment and repair the psychological damage which result from living in a continuous state of nuclear terror. □

John E. Mack is chairman of the executive committee of the department of psychiatry of Harvard Medical School, Cambridge, Massachusetts (02139).

Deborah Shapley reviews

Nuclear War, Nuclear Peace
by Leon Wieseltier
A New Republic Book; Holt, Rinehart and Winston
109 pages, \$2.95

A centrist movement is finally appearing between the extremes that have dominated the nuclear arms debate lately: the right, which frankly favors nuclear weapons, and the left which, equally frankly, opposes them. The direction of this movement is hardly clear; even the label may be premature.

But this wonderfully argumentative essay by Leon Wieseltier, 32-year-old literary editor of *The New Republic* and member of Harvard's Society of Fellows, assays the ground between right and left that a centrist movement should command. The book may well fuel such a movement, as much as Jonathan Schell's *Fate of the Earth* fueled the Freeze.

Wieseltier slashes at right and left in one passage after another, knocking down Schell, E.P. Thompson, Fred Iklé, Colin Gray, Edward Luttwak, Eugene V. Rostow and even George Kennan. At the end of the bloody business, Wieseltier is left standing, sword in sweaty hand, and not quite alone. For in resur-recting deterrence as the centerpiece of a sound nuclear strategy, he is in the company of strategist Bernard Brodie and former defense secretary Robert McNamara.

Wieseltier criticizes the left for preaching the moral imperative of get-

ting rid of nuclear weapons while abandoning the equally important fight against totalitarianism, especially communism. He is just as angry with the right for "hallucinating" that we can "prevail with pride" in a nuclear war, when nearly all the targeting strategies advanced since James Schlesinger's tenure as defense secretary would exterminate the very Americans the war was supposed to defend. Charging through the maze of the nuclear debate, Wieseltier argues that at every turn the idea of deterrence has been "trashed," invoked wrongly to support "crimes," in his view.

He criticizes Schell and Thompson, because both presume that possession of The Bomb has made the United States and the Soviet Union equally evil. He calls Schell's book "a classic of irresponsible idealism" because it concludes by giving up on nation states and urging world government. Thompson's "third way" between capitalism and communism is neutralism and thus an abandonment of moral principles, he says. Moreover, possession of The Bomb is hardly the defining characteristic of the Soviet Union or the United States: "The extraordinary thing about life since Hiroshima, however, is the extent to which it has not changed." To rest one's political strategy solely on getting rid of The Bomb, Wieseltier argues, is to abandon the fight for Solidarity in Poland, the rebels in Afghanistan and freedom everywhere. "Staying above the war of ideas is not spiritual triumph, it is spiritual collapse."

The left's abandonment of morality is equalled only by the right's willingness to sacrifice its own flock. Wieseltier scores the right's fascination with war-fighting and war-winning strategies, which ignore the reality that those who survive a counterforce attack won't feel strongly about values, or even freedom. The two sides will be fighting only over rubble; "patriotism will also die by radiation."

Third, Wieseltier takes on the NATO allies. He favors deployment of Pershing and cruise missiles in Europe because they make deterrence credible; they lower the U.S. price of defending Europe

and raise the Soviet risk of attack. He is scathing on the Allies' refusal to pay for an adequate conventional defense, and their insistence that the United States provide Europe a nuclear shield. They are forcing the "sacrifice" of America for their own higher standard of living, he argues.

Together with many liberals, the author has grudging respect for the idea of "no first use," as a way out of NATO's nuclear dilemma through improved conventional defenses. "There is a thrilling thesis about history in 'no first use,'" writes Wieseltier. "[T]here remains before us not the choice between peace and extinction, which is the conventional wisdom about the nuclear age, but the choice between peace and war. No first use, in other words, is a proposal for the normalization of the nuclear world."

Wieseltier proposes deterrence, allowing each side to keep the structure of its nuclear forces but reducing by mutual agreement the numbers of weapons un-



Over Our Dead Bodies
Women Against the Bomb
EDITED BY DOROTHY THOMPSON

Arguing that the question of nuclear war is too important to the future of the world to be left to the "experts," here are the voices of deeply concerned women from all over the world: historians, novelists, politicians, philosophers and peace activists.

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til each side has the minimum required to "murder" the other on a second strike (McNamara's assured destruction formula of 50 percent of industry and 20 percent of population). Deterrence is modest, and far from moral or perfect in its own right. But it might work, especially since (unlike nuclear war-fighting) it offers a "regulating principle" for arms control.

Wieselstier's deterrence program also considers what would happen should deterrence fail and a nuclear war occur. He asks the military to focus on protocols for war termination to secure lines of communication between the two sides, and to initiate diplomatic drills so that leaders would have a better chance of acting rationally to end the war soon. This, he argues, is more effective than pouring brainpower and technology into post-attack scenarios and counter-strikes, which corrupt deterrence by tempting leaders to believe a war could be fought.

Deterrence suggests a foreign policy that would reconcile anti-communism with arms control. There is no contradiction, Wieselstier argues, because the arsenal itself is so large: one can be safely anti-communist, and threaten the Soviets just as much, once both

sides have reduced their stockpiles by half. Both arms control and possession of The Bomb would then be subordinate, *not* the centerpiece of foreign policy.

Wieselstier's book, for all its *éclat*, has problems. His many arguments are presented with equal force, in brilliant prose, but are not equally valid. It is wrong, I think, to blast the European allies for declining to pay more for their own defense, for "sacrificing" Americans in a nuclear holocaust when, as Wieselstier doubtless knows, the Soviet Union will strike against Europe too, perhaps causing proportionally more casualties there. Nor is any quarter given to those European governments which have stood fast with the Pershing and the cruise; the role of their domestic opposition is overstated.

Finally, the details of this new centrism are vague. Wieselstier wants a triad of deterrence, arms control and anti-communism. But the usefulness of this trinity as a platform will rest on how it works in real political life—not whether it is logically consistent with Wieselstier's moral philosophizing.

Nonetheless, the book has much appeal. It suggests action, not resignation, in the nuclear age. We need not lie down and call everything else off until The Bomb goes away, it argues. Indeed, The Bomb isn't going to go away—not entirely, anyway. In the meantime, we must construct realistic policies to cut nuclear weapons on both sides by, perhaps, one-half, using deterrence and arms control in tandem to influence the Soviets, and working with them on other non-nuclear fronts as well. To many politicians and members of the public who favor the freeze in principle but feel hemmed in by its limits as practical policy, and to Republicans squirming about their President's bloodthirsty views of nuclear arms, this call should be welcome. □

Deborah Shapley, a member of the Bulletin's board of editors, is a visiting scholar at Georgetown University's Center for Strategic and International Studies in Washington, D.C. (20006).

Films

Karen Sayer reviews

In the Nuclear Shadow:

What Can the Children Tell Us?

Produced by Eric Thiermann, Vivienne Verdon-Roe and Ian Thiermann. Distributed by Educational Film & Video Project, 1725 B Seabright Ave., Santa Cruz, California 95062. 16 mm or 3/4 in. videocassette, color, 26 min., 1983. \$295 (16 mm) or \$75 (video) purchase, \$40 (16 mm) or \$25 (video) rental.

There's a Nuclear War Going on Inside Me, 21 min.; Third Graders Discuss Nuclear Issues, 35 min.; Fifth Graders Discuss Nuclear Issues, 13 min.; Ninth Graders Discuss Nuclear Issues, 30 min. Produced for International Physicians for the Prevention of Nuclear War by Intersection Associates, 56 Chestnut St., Cambridge, Massachusetts 02139. 3/4 in. and 1/2 in VHS videocassette, color, 1982. \$100 purchase, \$35 rental.

Bombs Will Make the Rainbow Break

Produced by Zahm/Hurwitz for the Children's Campaign for Nuclear Disarmament. Distributed by Films, Inc., 1213 Wilmette Ave., Wilmette, Illinois 60091. 16 mm or 3/4 in. videocassette, color, 17 min., 1983. \$390 (16mm) or \$195 (video) purchase, \$45 rental.

If you could show only one film about the impact on children of the threat of nuclear war, *In the Nuclear Shadow* should be it. Produced with great sensitivity, it records young people, ages seven to 17, in unhearsed interviews as they tell of their feelings about living under the threat of the bomb. Responding to a questionnaire developed by John E. Mack, a Harvard Medical School psychiatrist, they talk about their fears and nightmares, their doubts about the future and their own survival,

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Longterm environmental and biological consequences of nuclear war
Gerard Piel, publisher of *Scientific American*, will moderate a discussion amongst Hugh DeWitt, Richard Garwin, Robert Jastrow, Carl Kayser, Matthew Meselson and General Brent Scowcroft. They will address the implications of new weapons systems and discuss the challenges to national security posed by new technologies as well as the role of scientists in the changes.

Nuclear winter and its consequences to strategic policy

Walter Orr Roberts will lead a symposium including F. Kenneth Hare, David Pimental, Stephen H. Schneider (session organizer), Richard Turco and Charles Zrake.

For more information, please contact AAAS, 1515 Massachusetts Ave. NW, Washington, D.C. 20005.

their anger at adults for building such a dangerous world and then dumping the nuclear problem on their shoulders. They also talk about their need to discuss the issue with their parents and other adults, their sense of urgency in working to end the threat of nuclear annihilation, and how working with others for social change helps overcome their feelings of despair. "Action," one child states, "is what makes me feel better."

This is not a film of angry kids spouting off, but of children revealing their sorrows, hopes, fears and frustrations in an honest and amazingly gentle way. They understand that many adults are not uncaring but simply fearful of confronting the reality of the nuclear threat. The film is simple and direct. In the opening sequences psychiatrists Mack and Robert J. Lifton provide a context for the children's remarks. While there are a few shots of mushroom clouds, examples of nuclear blast effects and scenes from Hiroshima, the camera mainly focuses on the children's faces. We see tears well up in their eyes as they talk of their frustration, their overwhelming sense of responsibility to deal with the nuclear issue and their incredible sadness at the thought of losing the world. We also see their faces fill with joy as they describe how they would feel if they suddenly learned that all the nuclear weapons were gone.

Articulate, aware, fearful yet courageous and wise beyond their years, these children have a message for older generations. It is both a plea for and an offer of help to end the nuclear threat and save humanity. One teenager says, "A wonderful thought that gives me great strength . . . is that if the human race can make it through faced with total destruction, then our potential is so amazing. It's like the ultimate hurdle."

International Physicians for the Prevention of Nuclear War and the Facing History and Ourselves National Foundation, Inc. collaborated on a project in which students discussed with adult leaders their thoughts and feelings about nuclear weapons and nuclear



Paul Valery, West Germany

war. Several of the classroom discussions were documented on videotape.

There's a Nuclear War Going On Inside Me provides an overview of the project and includes an introduction by physician Eric Chivian, educator Roberta Snow and selected comments from third, fifth, seventh and ninth grade students. *Third Graders Discuss Nuclear Issues* is an edited videotape with Chivian as the adult leader, while *Fifth Graders Discuss Nuclear Issues* and *Ninth Graders Discuss Nuclear Issues* are edited tapes of classroom sessions in which Chivian and Snow serve as group leaders.

The productions provide a sampling of student responses to such questions as: How many of you know about nu-

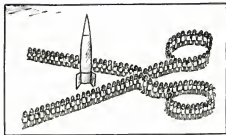
clear weapons? How did you find out about them? What comes into your mind when you think of nuclear weapons? How does this make you feel about your future? What can we do about stopping nuclear weapons and preventing nuclear war? From their answers, the children are evidently very fearful, yet eager to talk about the issue and willing to work to reduce the threat of nuclear war.

Bombs Will Make the Rainbow Break is a very competently produced (though at times a bit slick) documentary about children and the bomb. Through their words and artwork, several children from varied backgrounds express their fears about the horrors of nuclear war. Another child expresses anger toward adults who seem to "care too much about power and money" and not enough about preserving life. It gives many examples of ways in which children can participate in the effort to eliminate nuclear weapons—marching, writing letters, making posters and talking with others.

To summarize, few could watch *In the Nuclear Shadow* and not be moved; it should be required viewing for parents, teachers, clergy, policy-makers and adults everywhere. *There's a Nuclear War Going On Inside Me* and the accompanying tapes are technically rough but would be useful viewing for parents and educators, especially teachers who are preparing to introduce nuclear war education units into the classroom. Finally, because *Bombs Will Make Rainbow Break* tends to blame adults considerably it would probably work best as a motivational film for an audience that was already convinced that the nuclear arms race should be halted. □

Karen Sayer, who has served as a volunteer staff member for Physicians for Social Responsibility and the United Campuses to Prevent Nuclear War, is a film consultant at Michigan Media, University of Michigan, Ann Arbor, Michigan (48109).

Unilateral initiatives



Bas, Greece

In this month's "Breaking the Nuclear Deadlock" Franklin Long cites historical precedents, both nuclear and conventional, for the progress that can begin from unilateral arms control initiatives. Thomas Hopper then argues for the abolition of offensive weapons systems and the deployment of weapons that can serve only defensive purposes. —The Editors

by Franklin A. Long

ARMS CONTROL is generally thought of in terms of formal negotiations with an opponent, with the resulting agreements embodied in a treaty. This is not surprising, since arms control discussions between opponents are both important and politically visible. There are, however, strong reasons for countries to consider and frequently take unilateral initiatives.

To do so is entirely consistent with the established major precepts of arms control, which state that arms control is designed to reduce the risk of war, the costs of preparing for war, and the death and destruction if war should come. Unilateral initiatives on what weapons are purchased, which ones are

eliminated and how forces are deployed can all relate to these objectives.

There are two main categories of motives for unilateral initiatives in arms control. In one category, *internal* national objectives are the dominant, often sole, driving force; the initiative is undertaken "for our own good."

Thus a nation might unilaterally retire an expensive or obsolete weapon system as the United States did with 2,000 B-47 bombers in the early 1960s, and in 1975 with the costly Safeguard system of anti-ballistic missiles at Grand Forks, North Dakota. Similarly, a nation might abandon plans for procurement of a new weapon if it appeared potentially destabilizing. Unilateral decreases in national military budgets constitute another example. Some of these internally-oriented initiatives may incidentally offer some reassurance to an opponent, and may enhance world stability to some degree, but these broader effects will not have been the prime objective.

Two other internal objectives which can lead a nation to take unilateral initiatives are crisis prevention and enhanced stability of relations with an opponent. In a world where catastrophic nuclear bombardment is the possible consequence of an accidental nuclear launch or of a rapidly erupting crisis, it behooves nuclear-armed nations to emphasize crisis stability and the prevention of accidents. Fortunately, both the United States and the Soviet Union have shown considerable responsibility in these areas.

The other category of national unilateral initiatives encompasses those intended to elicit a positive response from

an opponent. One example is an initiative, usually taken after some bilateral discussion, designed to be part of a two-way "mutual example" activity. Unilateral initiatives may also play a large role in tacit bargaining between nations, an approach that Thomas Schelling has discussed. In his words:

Tacit bargaining—bargaining in which communication is incomplete or impossible—assumes importance, therefore, in connection with limited war, or for that matter with limited competition. . . . The problem is to develop a *modus vivendi* when one or both parties either cannot or will not negotiate explicitly, or when neither would trust the other with respect to any agreement explicitly reached.¹

A unilateral initiative as part of tacit bargaining will be advanced in the expectation of eliciting a response from the other party, quite probably a response which will also take the form of a unilateral initiative. Charles Osgood carried this idea still farther by his proposal of Graduated Reciprocation in Tension-Reduction (GRIT), which he called "unilateral initiatives of a particular kind."² Osgood notes that an arms race "is a kind of graduated and reciprocated, unilaterally-initiated, inter-nation action," and the idea of GRIT is to produce a reciprocal sequence of unilateral actions that go in the reverse direction, specifically in a tension-decreasing and arms reduction direction. GRIT belongs to Schelling's broader category of tacit bargaining; it is simply a more ambitious and elaborated example.

The utility of both categories of national unilateral initiatives has been recognized by U.S. government agencies. In its 1975 annual report the U.S. Arms Control and Disarmament Agency says:



Franklin A. Long, professor emeritus of chemistry and of science and society, Cornell University, Ithaca, New York 14853, has long been actively involved in research on arms control and U.S. policies for national security. He participated in the 1963 negotiations for the Limited Test Ban Treaty and is author of *The Genesis of New Weapons: Decision Making for Military R&D* (1980).

Breaking the Nuclear Deadlock

Some unilateral arms measures can promote both national and global security. They may be unilateral actions in which we reduce the risk of accidental use of our own weapons or reduce the possibility that another country might be tempted to attack us. For this reason we [the United States] have introduced a wide range of technical devices designed to eliminate the possibility that one of our nuclear weapons could be fired by accident or without authorization. For this reason, too, we have invested enormous sums of money to foreclose the possibility that surprise attack might cripple our nuclear deterrent forces, in order to discourage the leaders of other countries from thinking, even in a severe crisis, that war is preferable to negotiation.¹

Going beyond this kind of unilateral measure, the Agency analysis suggests that formal arms control agreements are required, even while admitting that negotiating for these "is frequently a protracted, even painful, process." Because of this last qualification, the Agency report raises the question of whether more could be accomplished if the United States were to take the lead unilaterally in reducing or limiting our military forces. It answers this question by pointing to three examples where unilateral initiatives did lead to significant arms control, but it goes on to list cases where unilateral initiatives have failed to elicit constructive responses. In the end, the Agency concludes that unilateral initiatives can be useful, but that for substantive arms control negotiated agreements are essential.

CONCERN about adequate verification for arms control measures has complicated most arms control negotiations, formal and informal. This concern has been particularly high in the United States. Formal negotiations do permit the verification problems to be addressed directly by all parties, and verification provisions will usually be part of an agreed treaty. However, the nation that undertakes a serious unilateral arms control measure and hopes

Categories of national unilateral initiatives

Troop withdrawal

- decrease in numbers
- remove from advanced positions

Weapons withdrawal

- elimination or cuts in numbers
- remove from advanced positions
- weapon-free zones

Moratoriums (freezes)

- stop military programs, for example, weapons testing

Policies of no-first-use of weapons

- nuclear weapons
- other weapons, for example, chemical or biological warfare

Other restraints in military programs

- advance notice of weapons tests, war games and so forth
- minimizing accidental or unauthorized weapons use
- banning development of or deployment of specific weapons
- cuts in military budgets

Phased unilateral arms control initiatives

- arms control by mutual example
- arms control by graduated reciprocal actions

for a similar response must be willing to rely on its own capabilities to verify measures announced by the other party.

Hence the development of powerful "national technical means" for unilateral verification of certain types of military activities has been exceedingly important. It has greatly extended the range of feasible measures of arms limitation and control, including unilateral ones. Earth-orbiting satellites for Earth photography and for detection of telemetry and other electronic signals are key components of these enhanced national capabilities, although long-range detection and identification of seismic events—earthquakes and underground explosions—are also important. Article XII of the 1972 U.S.-Soviet Anti-Ballistic Missile Treaty provides that national technical means will be used for verification and commits each party "not to interfere with the national technical means of verification of the other" thus insuring the continuing availability of these capabilities.

The table outlines the principal categories of possible national initiatives for arms control, the main point being to emphasize the wide variety of possibilities. Unilateral initiatives in many of these areas have been proposed at one

time or another, sometimes seriously, other times as part of verbal jousting at U.N. or other international meetings. Many initiatives proposed as elements of projected bilateral or multilateral treaties can be considered as possible national unilateral initiatives if formal negotiations break down or fail to take place. For example, the frequently proposed U.S.-Soviet treaty for a comprehensive nuclear freeze contains several distinct partial freezes which have been considered for unilateral initiatives, for example, a moratorium on weapons testing and on missile deployment.

ALMOST immediately after the end of World War II the United States took two major steps in arms reduction. One was to bring a very large fraction of the U.S. armed forces in Europe and Asia back home and discharge them from the armed services. The other one was to curtail the production of military equipment promptly and drastically. Both moves were "for our own good." They freed many men and production facilities for peacetime pursuits and undoubtedly played a major role in the considerable and lengthy acceleration of the U.S. economy after 1945.

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At the same time the substantial "build-down" of military forces constituted reassurance to other nations that the U.S. position was not warlike. It is true that later events, specifically the Berlin blockade and the North Korean invasion of South Korea led the United States to reverse its position partially and begin to rearm. But substantial amounts of the shrinkage in military budgets and armed forces have remained with us.

Since World War II the United States has undertaken a variety of other unilateral arms control initiatives, some in response to internal concerns, others as an aspect of negotiations with the Soviet Union. One of the earliest was a moratorium on nuclear weapons testing that was entered into as part of an attempt to negotiate with the Soviets a comprehensive nuclear test ban.⁴ The principal impetus for these negotiations was the worldwide alarm at radioactive pollution of the atmosphere from U.S. and Soviet nuclear weapons tests.

In the spring and fall of 1957 the Soviet Union proposed a two- or three-year international moratorium on nuclear tests to be supervised by an international commission. After some hesitation the United States rejected this. Toward the end of 1957 the Soviets again proposed a three-year test moratorium, in this case to be uninspected. This too was rejected by Washington, which countered by proposing a tripartite—U.S., British and Soviet—discussion of technical requirements for verifying a nuclear test ban. This occurred in the summer of 1958 and was successful enough to make it reasonable to proceed promptly with explicit negotiations for a weapons test ban.

To accelerate negotiations, the United States announced that it would unilaterally abstain from nuclear testing for a year from the date when negotiations began. The Soviets independently decided to ban tests, and for a period of almost three years there were no tests of nuclear explosives by the major nuclear powers. The two separate moratoriums held in spite of difficulties in negotiations toward a comprehensive test ban

treaty and a decline in U.S.-Soviet relations. The end came in August 1961 when the Soviets announced the resumption of nuclear testing, thus ending their voluntary moratorium. The United States promptly followed suit.

In spite of ultimate failure to negotiate a full ban on nuclear weapons tests, the two moratoriums were useful in two ways. They permitted the test ban negotiations to occur in a less difficult atmosphere than would have existed had testing been going on; and they greatly appeased the non-nuclear nations of the world, since it was a period of freedom from further radioactive contamination of the atmosphere. The Limited Test Ban Treaty, negotiated in 1963, put a stop to atmospheric testing, even though it permitted underground testing to continue.

A quite different kind of unilateral U.S. initiative occurred during this same period, specifically in 1962–1963. This was the unilateral elimination of what had been a major component of U.S. strategic delivery systems. The B-47 bomber had been developed with delivery of nuclear weapons as a major component of its missions. Its range was relatively short, and as a consequence it was primarily based in allied countries on fields from which a bombing run to the Soviet Union could be made. Once the B-52 was developed and in production the U.S. military decided that the B-47, given its short range and expense to operate, was effectively obsolete. A decision followed to eliminate it from the U.S. forces.

There were some U.S. attempts to have their elimination be part of a joint U.S.-Soviet effort, in which a Soviet weapons system would be scrapped in return for scrapping the U.S. B-47s. These explorations produced no results, and ultimately the B-47s were retired from service and "mothballed."

This may not qualify as a major initiative toward peace and stability, since the decision that the weapon was obsolete had already been made. However, retiring them did preclude other less stabilizing solutions, such as selling or giving the B-47s to allied countries or

even Third World countries. Another destabilizing alternative would have been to keep them in semi-readiness, as has frequently been done with more or less obsolete weapons.

A unilateral U.S. initiative played a major role in ultimately obtaining a worldwide treaty banning biological weapons. The move came in 1969 when President Nixon declared that the United States unilaterally renounced first use of lethal or incapacitating chemical agents as weapons, and unconditionally renounced all methods of biological warfare. Henceforth, he said, the U.S. biological program for the military would be confined to research on strictly defined measures of defense, such as immunization. In early 1970 this ban was extended to cover toxins—lethal chemicals produced by biological processes—of potential use in chemical warfare.

Other nations, following the U.S. example, also banned biological weapons and toxins. These actions accelerated consideration of a formal agreement, and a Convention was signed in 1972, prohibiting development, production and stockpiling of bacteriological and toxin weapons and calling for destruction of any stocks of such weapons. This Treaty was ultimately accepted by a large number of nations. Recently, however, it has come under a cloud because of U.S. charges that the Soviet Union has been uncooperative with respect to information on an anthrax outbreak in Sverdlovsk, and on possible uses of toxins in Southeast Asia. But the information in each instance is somewhat ambiguous, and the cases would not appear to constitute reasons to abandon a treaty that overall has been widely accepted and presumably adhered to.

OBVIOUSLY, we know more about U.S. unilateral initiatives for arms control than we know about Soviet initiatives. American records are extensive and accessible (for example, the annual Documents on Disarmament of the Arms Control and Disarmament Agency) and give full coverage to U.S.

activities. Still there have been numerous Soviet initiatives. Their 1957 proposals for a moratorium on testing nuclear weapons are an early example. Somewhat later, after negotiations for a comprehensive test ban had bogged down, and following the Cuban missile crisis in the fall of 1962, Premier Khrushchev sent a personal letter to President Kennedy. In it, he urged another effort for a comprehensive test ban treaty, and stated Soviet willingness to accept "two or three on-site inspections of detected but unidentified seismic events in the USSR," under the assumption that this last was the major impediment to reaching a treaty. That major unilateral initiative, unfortunately, did not break the deadlock. But it helped in eventually obtaining a limited test ban treaty, as did President Kennedy's unilateral commitment in his June 1963 speech at American University, that the United States would not carry out nuclear weapons tests in the atmosphere so long as other states did not.

Several unilateral Soviet and U.S. efforts are in the category of mutual example, or perhaps phased unilateral initiatives. The independent but coinciding establishment of moratoriums on nuclear weapons testing in 1958 was a mutual example, although not so labelled. The parallel cuts in U.S. and Soviet defense budgets in 1963 and 1964 seem clearly to have been a case of mutual example, initiated during high-level tripartite talks among U.S., Soviet and British officials in late 1963.⁵ After this meeting, President Johnson and Premier Khrushchev independently announced projected cuts in military expenditures. In subsequent comments, Khrushchev used the phrase "reciprocal example," and another Soviet official urged other nations to follow what he called the "mutual example" route. This joint effort continued into discussions of military budgets for 1965-1966, but soon petered out, due in part to the growing U.S. involvement in Vietnam.

A related pair of unilateral moves occurred during this period, involving military force reductions in Europe. In

April 1964 it was announced that 8,000 U.S. troops were being withdrawn from West Germany, and soon after that 14,000 Soviet troops were withdrawn from East Germany. It has been suggested that the Soviets might have hoped for further U.S. reduction in force levels, that is, a continuation by phased unilateral initiatives; but this did not happen.⁶

Given these efforts and the earlier positive Soviet initiatives for a nuclear test ban, it would appear that Khrushchev was seriously interested in arms control and reduction in tension between the United States and the Soviet Union. Unfortunately, he was soon removed as a force in Soviet policymaking, as Kennedy, more tragically, had been in the United States.

An area of unilateral initiative in which both the United States and the Soviet Union have been involved is in policies of no-first-use of particular weapons. In the midst of World War II, Franklin D. Roosevelt declared that America would not be the first to use chemical weapons in that war. In 1970, in connection with a renunciation of production and use of biological weapons, President Nixon also reiterated that the United States would not be the first to use lethal or incapacitating chemical weapons in war.

In the years after World War II, when the danger of nuclear war had become evident, pledges of no first use of nuclear weapons were strongly urged by many nations. Two sorts of pledges were urged: a general one—not to be the first to use nuclear weapons—and a specific one—not to use nuclear weapons against non-nuclear weapons states. China made both pledges, and urged the United States, the Soviet Union and other nuclear nations to follow suit. In 1982, at the Second U.N. Special Session on Disarmament, the Soviets formally pledged the general obligation not to be the first to use nuclear weapons. The United States has not yet committed itself to either pledge.

U.S.-SOVIET relations are currently

rather chilly. Two major arms control negotiations, START and INF (intermediate-range nuclear forces), are now suspended, following a Soviet walkout triggered by NATO deployment of intermediate-range nuclear missiles in Europe. The bilateral arms race continues, and recent pressures to extend it into outer space are particularly alarming.

Now, if ever, is a time to examine what constructive unilateral arms control steps might be taken by the two nations. It is a time for each nation to examine its military programs to see if developments that have strong destabilizing prospects might be halted. It is also a time for each to consider whether to undertake the kind of "mutual example" initiatives that might elicit a comparable move by the other.

Stopping the further militarization of outer space is particularly urgent. The most immediate problem is the testing and eventual deployment by both nations of anti-satellite (ASAT) weapons, that is, weapons designed to destroy orbiting satellites of other nations. A moratorium by each nation on testing anti-satellite weapons would enhance the security of both nations and give time to develop a formal treaty, accessible to all nations, to ban deployment of these weapons. Either nation could take the initiative in this. In August 1983 the late Soviet President Yuri Andropov made a first move in this direction by announcing a unilateral moratorium on ASAT tests as long as "other nations, including the U.S., will refrain from stationing in outer space anti-satellite weapons of any type." Official U.S. comment was guarded, and there has been no corresponding U.S. pledge, but the door appears open for further discussion and possible negotiation.

Other helpful unilateral initiatives exist, as the following brief "checklist" of some of the more obvious ones suggests. The emphasis here is on possible U.S. initiatives, but in most instances a comparable Soviet initiative is both conceivable and desirable.

- A moratorium on the deployment of specific classes of weapons. Ex-

amples are a U.S. moratorium on deployment of submarine-launched cruise missiles and a Soviet ban on deployment of further SS-20 missiles.

- *Withdrawal of weapons.* A NATO or Warsaw Pact initiative to withdraw all nuclear weapons from their common border, by perhaps 50 kilometers, is an example.

- *Withdrawal of troops.* A pair of separate but phased troop withdrawals by NATO and the Warsaw Pact would greatly enhance the possibility of obtaining of a treaty on mutual force reductions.

- *Independent but phased constraints on U.S. and Soviet naval forces in the Indian Ocean.* Here would seem to be a case for a mutual example.

- *Joint, independent moratoriums on underground weapon testing.* This move would be in the context of renewed negotiations for a comprehensive ban on nuclear weapons tests.

Unilateral moves are also appropriate for smaller nations. Israel, for example, could unilaterally enhance Middle East stability by a substantial decrease in its military budget. This would be a reasonable move to consider, since the existing peace treaty

with Egypt has lessened the need for the increased force levels that Israel adopted after the 1973 war. Vietnam might withdraw its troops from Kampuchea, as a gesture toward a wider agreement in Southeast Asia.

NATIONAL arms control and disarmament initiatives are much more likely to be productive, that is, to lead toward reduction of tensions and avoidance of war, if they are taken as part of a broad and continuing mutual effort. A unilateral arms control initiative is far more likely to generate a positive response from an opponent if there has been prior discussion and some mutual understanding that such initiatives are in the interest of both parties. Furthermore, each nation involved will be more likely to achieve its own arms control objectives if there is considerable advance study and planning.

Put another way, if tacit bargaining, in Schelling's meaning, is to be entered into it should be taken seriously, with proper analysis and continued planning. This needs to be said because there is little indication that the U.S. Arms Control and Disarmament Agency or other U.S. agencies have seriously

analyzed national unilateral initiatives or desirable Soviet responses. This remains the case even though the development of substantial capabilities of verification by national technical means has considerably widened the possibilities. Yet precisely because current prospects for success in formal arms control negotiations seem dim, this is surely a time for more emphasis on unilateral initiatives and more discussion with the Soviet Union about possibilities. □

1. Thomas C. Schelling, *The Strategy of Conflict* (Oxford: Oxford University Press, 1960), p. 53.

2. C.E. Osgood, *An Alternative to War or Surrender* (Urbana, Illinois: University of Illinois Press, 1962), pp. 86-87.

3. U.S. Arms Control and Disarmament Agency, annual report (1975).

4. H.K. Jacobson and E. Stein, *Diplomats, Scientists and Politicians: The U.S. and the Nuclear Test Ban Negotiations* (Ann Arbor, Michigan: University of Michigan Press, 1966); G.S. Seaborg, assisted by B.S. Loeb, *Kennedy, Khrushchev and the Test Ban* (Berkeley, California: University of California Press, 1981). The initial pages give a succinct account of various proposals for a moratorium on nuclear weapons testing.

5. A.S. Becker, *Military Expenditure Limitation for Arms Control* (Cambridge, Massachusetts: Ballinger Publishing Co., 1977).

6. *Ibid.*

A call for defensive weapons

by Thomas Hopper

ANY TRUE peace proposal must go beyond the limited goals of arms control and arms reduction and instead adopt a goal of true disarmament. Left in place, our awesome weapons will inevitably fulfill their globe-shattering destiny. The door to the future will slam shut if we do not remove the capability of one nation to

attack another. At the same time, however, a peace proposal must not seem so radical as to alienate the political majority which holds its only chance of adoption. This seeming paradox has frustrated the forces of peace for years.

Harry B. Hollins has advanced a strikingly simple and compelling proposal: not general and complete disarmament, but rather disarmament of offensive weapons by all nation states.¹

This approach could achieve the basic objectives of the most strident disarmament advocate, while still maintaining national sovereignty to the satisfaction of the most rock-ribbed conservative. It could be the beginning of a true breakthrough in disarmament strategy.

To prepare for such a breakthrough, however, the proposal must answer two fundamental questions:

- Which weapons are defensive, and which are offensive?

- What is to prevent the reconstruction of offensive weapons in a disarmed world?

Hollins begins to answer the first of these questions by suggesting that weapons such as minefields, fixed gun



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Categorization of Offensive and Defensive Weapons

	<i>Defensive</i>	<i>Offensive</i>
Strategic weapons	None	Nuclear weapons of all types Ballistic missiles
Aircraft	Small fighters with limited range and payloads limited to air-to-air rockets	Bombers of all sizes and long-range fighters
Naval vessels	Small coastal defense and rescue/patrol vessels with limited range and firepower	Submarines Aircraft carriers Surface vessels armed with more than light weapons
Minefields	Land mines	Naval mines
Ground forces	Infantry (massed infantry could be used in an offensive manner, but is unlikely to be effective against defensive emplacements without support of armor, mobile artillery, and ground-support aircraft) Fixed artillery and anti-aircraft emplacement Light weapons (automatic rifles, police-type armored cars and so forth)	Tanks Mobile artillery (including light artillery such as anti-tank weapons and bazookas) Ground-to-ground rockets
Chemical and bacteriological	Tear gas (for police use only)	Chemical weapons other than tear gas Bacteriological weapons

emplacements, and anti-aircraft could be classified as defensive. But a more complete definition of the defensive/offensive dichotomy is essential to the development of a persuasive vision of a disarmed world. With this in mind, I offer the following general definition of purely defensive weapons: Defensive weapons are those which cannot effectively be used against the defensive emplacements of another nation and which cannot be used to physically attack the economic lifelines of another nation. (See table.)

Within the category of defensive weapons, there would be no restriction on the number of weapons each nation

might possess, except that the total size of national military forces, police forces and trained military reserves would be limited to some fairly small percentage of the adult population.

Disarmament to defensive levels would be carried out under the auspices of the United Nations in a series of carefully controlled, gradual stages spanning perhaps as many as ten years. The initial stage of the disarmament process could concentrate on measures to stop the construction of additional offensive weapons, to stop research and development on offensive weapons, and to stop the international arms trade in offensive weapons. Secondary stages

of disarmament could begin the actual reduction of existing offensive weapons, starting with conventional weapons and some of the more dangerous and destabilizing nuclear weapons, and ending it with the dismantling of the most secure strategic weapons, such as submarine-launched ballistic missiles.

Inspection is a key disarmament issue, and there is every reason to believe that an extremely effective inspection system can be constructed. The inspection network would obviously employ satellites, whose photographic powers enable them to identify objects as small as a few square inches. To assure complete adherence to each disarmament stage, however, inspection would also have to include such politically sensitive facets as on-site inspections and access to military records. This type of physical inspection would be entered gradually, on an as-needed basis to support the various disarmament stages, and by the end of the disarmament process it would amount to the de facto abolition of military secrecy. Key facilities such as nuclear reactors might be given permanent resident inspectors, while all industrial and military facilities would be subject to both regular and unannounced inspections.

The complexity of modern weapons systems would greatly simplify the inspection process, since such weapons systems consist of hundreds or even thousands of interrelated component parts, all of which must operate before the system can function. Successful evasion of a disarmament agreement, then, must occur at *every* place where the components of a weapons system are produced or stored, while successful inspection need only occur at one or a few key places.

Military projects, such as the Manhattan Project which constructed the atomic bomb during World War II, are kept more or less secret with the aid of tight security measures. Could such a project be kept secret in a disarmed world if a hostile inspection force had access to government records, sophisticated aerial and satellite reconnaissance techniques, and the privilege of on-site

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inspections? Obviously not. And just as obviously, in the face of insurmountable odds against success and grave penalties for failure, no nation would even attempt to evade the disarmament agreement.

BUT what is to prevent reconstruction of offensive weapons in a disarmed world? There can be only one answer to this question, and that is the existence of a United Nations peace force, itself armed with offensive weapons.

Hollins writes that "The notion of transferring effective military power and control of that power to a world authority has repeatedly met solid opposition from the Soviet Union and it is also quite doubtful that the United States would accept it." Several factors combine to defuse this argument:

- Neither the Soviet Union, the United States nor any other nation is likely to agree to disarm all offensive weapons, even with an effective inspection system, in the absence of some mechanism for enforcing and maintaining the abolition of offensive weapons.

- "Disarmament to defensive levels" is different from previous disarmament proposals in that it would allow each nation to maintain a substantial military force. This factor could greatly lessen Soviet or U.S. objections to a U.N. peace force.

- The U.N. peace force proposed here would be relatively small: large and powerful enough to crush any national rearmament effort or attempted aggression, but not large enough to be a world-policing tyrant.

The U.N. peace force should be too small to act as an army of occupation, with perhaps 250,000 or fewer active members. If, in the aftermath of some unlikely emergency, an occupation force did become necessary, the U.N. General Assembly could authorize the construction of such a force from the world's national defense forces.

This small standing peace force should be dispersed at bases around the world and should be provided with advanced offensive weapons of the type denied to national forces (tanks, long-

range bombers, large naval vessels such as aircraft carriers, and so forth.) Although the peace force should not be armed with nuclear weapons, it might well possess ballistic missiles with large conventional warheads. The sole function of the peace force would be to strike swiftly, surely, and overwhelmingly to stop any violation of the disarmament agreement.

The peace force would be controlled and directed either by the U.N. Security Council or General Assembly. In either case, however, changes would have to be made in the existing organizational structure. The current ability of the major powers to veto Security Council decisions could be a dependable guardian of world peace. Likewise, before control of the peace force could be given over to the General Assembly, that body would have to be restructured away from its current "one nation, one vote" principle. Perhaps a structure along the lines proposed by Grenville Clark and Louis B. Sohn in *World Peace Through World Law* would be more acceptable to the larger nations, and thus politically feasible: the four most populous nations would have 30 representatives each, the eight next largest nations, 15 representatives each, the 20 next largest nations, 6 representatives each, and so on.²

Hollins has ably summarized the overwhelming advantages of disarmament to defensive levels: it "would effectively eliminate the possibility of nuclear war; reduce global military expenditures by over \$400 billion annually; enable national governments to reduce taxes, stop inflation and decentralize government functions."

What justification could be advanced for opposing such a plan? Hard-liners of the right could be expected to wage fear campaigns about the "loss of national sovereignty to a world government," but the United Nations would certainly not be a world government, and the only sovereignty lost would be the dubious sovereign right to attack another nation. The far left might be expected to rail against disarmament as "freezing the status quo," and would

need to be reminded that disarmament would mark the beginning of effective international law and that "one rule of law, the rule that agreements must be kept, has caused more change in the world than all the governmental appropriations and expropriations in history."³

The brickbats from the political fringes would be feeble in comparison to the benefits of peace and could be easily struck down. The approach to world peace presented here is not a radical one based on trust and goodwill, but is instead a pragmatic approach to national and international security behind which a large enough majority could unite to carry it off.

National security today is a myth. We are all in fact becoming less secure with each passing year, and we are paying an awesome, ultimately unbearable, economic price for our insecurity. People around the world are beginning to awaken to this. The politics of Europe are awash in debate over nuclear weapons, and the nuclear freeze campaign and Jonathan Schell's *The Fate of the Earth* have struck amazingly sympathetic chords in the United States. Perhaps a defensive approach to disarmament can galvanize this support and can take us a major step down the road to true peace and security.

Elisabeth Mann Borgese once wrote that "arms will never be surrendered by nations to a world government. Arms will end up in museums of surrealist art."⁴ Perhaps this is at least partly true, but the "ending up" requires a very large push from the broad political middle-of-the-road. The approach outlined here could provide such a centrist push to disarmament, but not complete disarmament; effective inspection; international control, but control of the most limited sort possible. □

1. Harry B. Hollins, "A Defensive Weapons System," *Bulletin*, 38 (June 1982), pp. 63-65.

2. Grenville Clark and Louis B. Sohn, *World Peace Through World Law* (Cambridge, Massachusetts: Harvard University Press, 1967), p. xx.

3. Arthur Larson, *A Warless World* (New York: McGraw-Hill, 1963), pp. 57-58.

4. Elisabeth Mann Borgese, "The World Communities," *The Center Magazine*, IV (Sept./Oct. 1971), p. 15.

Nuclear blackmail

by Joseph Gerson

PRESIDENT NIXON placed U.S. forces on a full nuclear alert in October 1973, during the closing days of the fourth major Middle East war in recent times. Since then it has been clear that regional conflict or superpower confrontation anywhere in the Third World could trigger the nuclear holocaust we so fear.

Such a confrontation was narrowly averted in June 1982 when Syrian occupation forces in Lebanon were ordered not to resist fully the Israeli invasion. If the Syrians had so resisted the Israelis and been defeated, the pressures for the superpowers to back their clients by any means necessary would have been tremendous. Today Israeli, Syrian and U.S. forces confront one another warily in and near Lebanon, and several thousand Soviet forces are manning modern anti-aircraft missiles across the border in Syria. Under these circumstances, the smallest spark could ignite a nuclear conflagration.

The traditional disarmament and newly created Freeze movements, with their efforts focused on assuring human survival, have until recently been hesitant to consider the fact that events in the Middle East, Central America and other Third World conflicts could well be the nuclear trigger for final annihilation. Similarly, the vast majority of Americans working to stop the slaughter in El Salvador or opposing U.S. military involvement in Latin America and the Middle East have given little thought to the ways nuclear weapons are used as an integral part of U.S. foreign policy.

A look at the past helps us to understand the present and possibilities for the future. In the case of U.S. use of nuclear weapons, the historical record is as shocking as it is little known. Daniel Ellsberg, the former advisor to Presidents Johnson and Nixon, observed at a conference at MIT that most Americans believe that no nuclear weapons have been used since the second crude atomic bomb was dropped on the civilian population of Nagasaki, Japan, in August 1945. He went on to explain that "generally in secret from the American public, U.S. nuclear weapons have been used in the precise way that a gun is used when you point it at someone's head in a direct confrontation, whether or not the trigger is pulled." Since World War II every president, with the possible exception of Gerald Ford, has prepared or has threatened to use nuclear weapons to maintain the U.S. sphere of influence which extends from Central America to the borders of the Soviet Union and China.

Several of the lesser known occasions when nuclear weapons have been used by our government to develop developments in the Third World follow. These examples are taken from a 1978 Brookings Institute Report, *Time* magazine and the daily press:

- In March 1946 President Truman threatened to drop "the superbomb" on the Soviet Union if it did not evacuate Kurdistan and Azerbaijan within 48 hours. The Soviets had occupied these provinces of northern Iran during World War II with U.S. and British approval, but the Soviets were slow to depart at war's end. They began their

withdrawal within 24 hours of Truman's threat.

- In 1954 Strategic Air Command bombers, armed with tactical nuclear weapons, were dispatched to Nicaragua to reinforce the CIA-sponsored coup which overthrew the president of Guatemala, Jacobo Arbenz Guzman. That same year Secretary of State John Foster Dulles offered the French government three tactical nuclear weapons to break the Vietnamese siege of French forces during the fateful battle at Dien Bien Phu.

- In 1958 President Eisenhower ordered the Joint Chiefs of Staff to use nuclear weapons, if necessary, to prevent the spread of the antimonarchist revolution from Iraq to neighboring oil-rich Kuwait. In the same year Eisenhower also ordered the Joint Chiefs of Staff to prepare to use nuclear weapons should China attempt to take the offshore island of Quemoy from the Kuomintang forces which had occupied it in 1949.

- In 1969 President Nixon and Secretary of State Henry Kissinger threatened to use nuclear weapons against North Vietnam in what they referred to as the "November ultimatum." A list of possible nuclear targets, including a North Vietnamese rail center a mile and half from the Chinese border, was prepared for President Nixon.

- More recently, in 1980, the daily press reported that President Carter had dispatched a naval flotilla, including tactical nuclear weapons, to the Persian Gulf following the overthrow of the Shah of Iran. Shortly thereafter he enunciated the "Carter Doctrine" which stated that "any attempt by an outside force to gain control of the Persian Gulf region would be regarded as an assault on the vital interest of the United States," and would be "repelled by the use of any means necessary."

- In 1981 President Reagan again threatened to use nuclear weapons to



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maintain U.S. access to the oil of the Middle East. He also accelerated the development of the Rapid Deployment Force—with its 230,000 military personnel and its considerable nuclear capabilities.

THE APPARENTLY mindless growth of the U.S. and Soviet nuclear arsenals has not been so irrational after all, though it may well be suicidal. For nearly two generations tactical nuclear weapons have been employed to influence the development and political life of essentially defenseless Third World nations according to the perceived in-

terests of policy planners in Washington and to maintain the U.S. "sphere of influence."

U.S. first-strike weapons—now including the Pershing II and cruise missiles—have been built and aimed at the Soviet Union to ensure that Kremlin leaders will be as extraordinarily cautious in countering the projection of U.S. forces into the Persian Gulf, Central America or elsewhere in the Third World as they were in October 1973. To quote Ellsberg, "The whole panoply of new arms and deployments [from] the usable neutron warhead and the Rapid Deployment Force to the Per-

shings and MX serve to implement presidential claims to have wired up the Middle East to a Doomsday machine."

As our communities and Congress consider the popular call for a bilateral nuclear weapons freeze, and as opposition builds to the deepening U.S. involvement in Central America and the Middle East, it would be well to remember the deadly connections between foreign military adventures in the Third World and nuclear war. Our survival depends as much on our work for peace and justice abroad—thus defusing nuclear triggers—as it does on freezing the nuclear arms race. □

The French bishops on deterrence

by Richard B. Miller

THE FRENCH Roman Catholic bishops, in November 1983, produced a document that addresses the issues surrounding nuclear arms and deterrence. Many have seen this document as departing from the criteria and judgments adduced in the historic pastoral letter by the U.S. Catholic bishops. The manner and extent to which the French bishops follow their U.S. counterparts require a careful and nuanced reading of both texts.

- *Method of reasoning.* The French document is simultaneously more alarmist and cautious than is the U.S. text. Both claim that the survival of the planet is jeopardized by present international tensions. Like the U.S. bishops, the French bring religious and moral wisdom to bear upon the perilous "signs of the times."

The overall contours of these documents are similar in that both argue that some forms of defense and deterrence are legitimate, and that constructive peacemaking is essential today. Both concur that peace requires more than the prevention of war.

Yet the French statement approaches these perils with greater brevity and generality than does the U.S. document.

The French bishops, unlike their U.S. counterparts, fail to set forth the specific moral and religious criteria by which public policy should be scrutinized. Nor are specific policies mentioned. The U.S. bishops, in contrast, devote considerable attention to moral criteria (just-war principles) as well as the specifics of targeting doctrine and war-fighting scenarios.

The greatest procedural difference concerns the use of religious categories in each argument. Both documents include a "theology of peace," where peace is seen as harmonious relations with others, the world and God. The U.S. bishops, however, devote the entire first section (out of four) to developing a theology of history within which current policies are placed and interpreted. Theology is invoked as an integral feature of the argument in the U.S. text, while the French begin with political and moral aspects and annex religious categories in an ad hoc fashion.

- *Use of nuclear weapons.* While the U.S. bishops invoke just-war principles as normative for evaluating the prospects of nuclear war, the French sidestep a methodical moral analysis to insist that all nuclear war is suicidal and thus immoral: "No cause could justify unleashing such a conflagration, for it is

a question of the survival of mankind." At the same time, the bishops insist that an absolute condemnation of all resistance is unwarranted. Like the U.S. prelates, the French argue that political leaders have the duty to defend their citizens against unjust aggression.

- *Deterrence and disarmament.* Both groups hold that deterrence serves the ends of national defense, agreeing that the immorality of using nuclear arms does not render the threat of use immoral. Thus, like the U.S. bishops, the French renounce use but do not unconditionally reject deterrence. The precise conditions under which it is acceptable differ, however. The French indicate that deterrence must be "concerned only with defense," must avoid "superarmaments," lessen the risk of error, and be accompanied by constructive peace-seeking policies.

Most notably, unlike the U.S. bishops, the French fail to link deterrence with disarmament as a condition of acceptance. They underscore the need for bilateral, reciprocal disarmament, but do not enjoin any kind of initiative or risk-taking to begin the process. The French overlook the distinction between unilateral disarmament and unilateral initiatives to facilitate disarmament—a point

which the U.S. prelates perceive, although they fail to develop it.

The French are most emphatic about the perils of "blackmail" that accompany unilateral disarmament: "In the end, peace at any price leads a nation to all sorts of capitulations. Unilateral disarmament can even provoke the aggressiveness of neighbors by feeding their temptation to seize too easy a prey." Accordingly, the French accept deterrence, when weighed against blackmail, as the lesser of two evils. In contrast, the U.S. bishops dropped the "lesser of two evils" language after critical responses to the second draft.

One anomaly appears in the French document on this issue. Deterrence is seen not only as an alternative to blackmail, but as a form of blackmail itself, because "certain countries really intend to obtain the advantages ensuing from war without paying the price of launching it. By simply brandishing the threat they exert permanent blackmail." This passage may refer only to the deterrence policies of the superpowers; but the French fail to indicate how deterrence exercised by the smaller nuclear powers is any less a form of blackmail than is that of the United States or the Soviet Union.

• *Pacifism and non-violence.* Like the U.S. bishops, the French underscore the state's duty to defend citizens against unjust aggression. But the U.S. bishops also highlight the validity of non-violent resistance as a means of national defense. Moreover, although pacifism is not an option for the state, it may be embraced by individuals.

The French declare, "The church does not encourage total pacifism," evidently in recognition of the state's duties. They are highly evasive about the legitimacy of individual pacifism. Non-violence provides a "prophetic reminder of the destructive character of violence"; it is found "only in the hearts of saints, like Francis of Assisi." As such, non-violence is a "spirit drawing its sap from the Beatitudes," and at most it is "a risk which persons may take." A "spiritualized" view of non-violence does not capture its radical religious and political im-

portance—factors more readily evident in the U.S. document.

• *World order.* Both the French and U.S. documents call for easing tensions and discovering sources of unity that transcend national divisions. The U.S. bishops identify "objective mutual interests" between the superpowers, such as past weapons treaties. They appeal to the "real but relative moral value of sovereign states" and invoke the principle of the "common good" as a way of affirming the moral imperatives which lie behind new global interdependence. Within such a perspective the economic implications of increased militarism become more easily perceived.

Similarly, the French prelates highlight the need for creative diplomacy and continuing dialogue in a divided world, but they fail to consider the worldwide implications—especially economic exigencies—that accompany arms competition. The French text appears less concerned with developing a global perspective than with the malaise affecting French moral and spiritual attitudes.

ON THE WHOLE, then, the French document is less prophetic and more circumspect about the multi-faceted perils of the nuclear age. The U.S. bishops appeal to a variety of religious motifs, biblical materials and traditional symbols which give their pastoral letter a more prophetic, challenging perspective. The ethical principles with which they address current policies are clearly stated and carefully applied. Their approach to global interdependence avoids political naiveté by drawing upon recent materials in political science. They enter into the difficult details of "strategic doctrine."

The French bishops prefer a more general level of discussion. But even there, in contrast to the U.S. document, one does not find an affirmation of selective conscientious objection, the claim that "states are called to interpret the national interest in light of the larger global interest," or the demand for "continual conversion." Seen in both religious and political terms, the French document is

less ambitious and less explicit about how international relations ought to be scrutinized, criticized or improved. □

Richard B. Miller is a doctoral student in the ethics and society division of the Divinity School, University of Chicago (60637).

Addendum

The film *U.S. versus U.S.S.R.: Who's Ahead?*, reviewed in the March issue of the *Bulletin*, is now distributed by The Arms Race Education Project, Box 76600, Washington, D.C. 20013.



Venice Course: Arms Race; Refugees

The tenth course of the International School on Disarmament and Research on Conflicts (ISODARCO) will be held in Venice, Italy, July 17-27, 1984.

The course will be focused on two main topics:

The Arms Race and Arms Control:
Status and Prospects

Refugees as Victims and Cause of
Conflicts

The course will be articulated in formal lectures, seminars offered by the participants, round-tables and open discussions. English will be the working language. Scholarships covering the full cost of participation (excluding travel) are available to those who do not receive support from other sources.

All inquiries should be addressed to the Director of the School:

Prof. Carlo Schaerf
Istituto di Fisica
I Università di Roma
"La Sapienza"
Piazzale Aldo Moro, 2
I - 00185 Roma (Italia)

Wisdom of the ages

I find the concept of preserving planet Earth to be more applicable for our nuclear world than for the pre-industrial world of the anonymous author quoted below. The paragraph was written between the first and ninth centuries in Israel and is commentary on Ecclesiastes 1:15:

When the Holy One created the first man, He took him before all the trees in the Garden of Eden, and He said: "See how lovely and how excellent My works are. All that I have created, I created for you. Consider this carefully. Do not corrupt or desolate My world. For if you corrupt or desolate it, there is no one to set it aright after you." (Midrashem-Kohelet Rabbah 7:28).

Manus Monroe
Novato, California 94947

Put the U.S. back in U.N.E.S.C.O.

The Reagan Administration's decision to withdraw from UNESCO is shortsighted and wrong. It portends a dangerous trend, with the right wing already touting this as a first step in getting the United States out of the United Nations. Even the U.S. Commission on UNESCO, an advisory body, voted by the overwhelming margin of 41 to 8 for the United States to stay in the organization.

Debate on this issue is difficult because Americans lack knowledge about the United Nations, particularly with regard to its family of over 30 specialized agencies, of which UNESCO is one. These U.N. agencies reach into every country, offering the best hope to overcome poverty and illiteracy and to aid development.

A few of these organizations are known in our society, such as the United Nations International Children's Emergency Fund (UNICEF), the World Food Program (WFP), the World Health Organization (WHO), and the International Bank for Reconstruction and Development more generally known as the World Bank.

UNESCO, which stands for United Nations Education, Scientific, and Cultural Organization, is one of the best known. Its responsibility is to enable people of every country to take development into their own hands by expanding education, disseminating scientific information, promoting better communication and encouraging the preservation of national cultural heritages. The preamble to UNESCO's charter says: "Since wars begin in the minds of men, it is in the minds of men that the defenses of peace must be constructed." The Organization has trained 60,000 teachers and helped to build schools in 24 countries. It publishes books in 70 languages on every important subject. Its monthly magazine, *UNESCO Courier*, is printed in 27 languages and is available to all people through subscription. It carries the views of scholars and thinkers from all lands, providing a global perspective on events and culture that is essential if we are to understand the emerging world community.

In science, perhaps its most important function is the gathering of scientists from around the world to share information. In 1968, UNESCO organized the first World Conference on the Biosphere, which stimulated new concern for environmental protection and helped make ecology a familiar term. It has brought together more than 100 countries to study world water resource problems, a matter of great importance in the developing world, where 90 percent of the people do not have safe drinking water. The Organization has also assisted in the creation of centers of physics, biology and mathematics in Latin America, Asia, Africa and the Arab States.

Two examples of UNESCO's cultural projects are its successful campaign to save 22 temples of Nubia, the ancient Egyptian monuments located on sites now covered by the Aswan Dam; and its participation in the attempt to save the Acropolis in Athens from being destroyed by pollution.

The Reagan Administration has offered several reasons for the U.S. withdrawal. They claim UNESCO's \$374.2

million two-year budget is excessive. But the United States was the only member to vote against it, and America's assessed annual cost of nearly \$50 million is less than the Pentagon spends every two hours.

The Organization is condemned as being too political and as taking an anti-U.S. stand on issues. But John Forbes, an American and former UNESCO deputy director general, recently stated: "Of hundreds of UNESCO meetings in the last 10 years, American and other Western participants will testify that the conspicuous cases of political, biased and unfair debate were few in number."

The most absurd complaint is that UNESCO talks too much about peace and disarmament, as if these were not the two most important issues confronting humanity. UNESCO's study on a new world economic order also bothers the Administration. But UNESCO represents all nations, and in this real world about half of humanity lives in dire poverty. How could any world organization not seek economic means to alleviate this suffering?

There is talk within UNESCO of a new order of information as some members believe the Western press regularly distorts the conditions and aspirations of Third World people. Most Western nations and the press think this would lead to government censorship. Both sides have some validity, but a solution is possible only by working together in good faith.

UNESCO does have bureaucratic problems, and they need to be resolved. There have been serious mistakes, as when the Arab bloc orchestrated a campaign to oust Israel. This was unacceptable, and was rescinded by the majority of members. This is the way to solve problems—not to run away from them.

U.N. Secretary General Javier Perez de Cuellar has stated that a "withdrawal by the U.S. from UNESCO would adversely affect the principle of universal membership, which is of fundamental importance to the entire U.N. system." Since Reagan took office the United States has offered the United Nations little other than negative votes

on important issues. In 1983, for example, the U.N. General Assembly voted on 45 disarmament resolutions: The United States voted affirmatively on only nine. This compares with "yes" votes by Mexico on 42 of the resolutions; 33 "yes" votes by Sweden; 35 by the Soviet Union. On seven major disarmament resolutions the United States cast the only negative vote. And it also led a small minority in voting against a U.N. resolution calling for a freeze on the production and deployment of nuclear weapons.

We need a government that understands the world community and has a vision for the future. This means a government that acknowledges the drift toward nuclear war, one whose first priority is to stop the arms race. The United States should help strengthen the United Nations and other international institutions so they may effectively deal with global problems. If we do not recognize this need, we crush the hopes and dreams of the future.

Douglas Mattern
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Mortality experiences of A-bomb survivors

The International Commission on Radiation Protection still bases its recommendations on the assumption that late effects of atomic radiation are always the result of mutations and never the result of damage to bone marrow and other blood forming tissues. But these tissues, which control immune responses as well as red cell production, are exceptionally sensitive to cell-killing as well as mutational effects of radiation. It was, in fact, this sensitivity which caused thousands of persons who had survived more immediate effects of the Hiroshima and Nagasaki bombs to die from fulminating infections and obscure blood diseases during the fall of 1945.

These persons were automatically excluded from all subsequent studies of radiation effects and, even after the roundup of five-year survivors, there was no attempt to identify persons who

had experienced acute effects of marrow damage. Thus, the reason it is so firmly believed that all non-cancer mortality effects of the two nuclear explosions were exhausted in under six years is because analysts of a mortality study, which began in October 1950, have never found any evidence which they consider to indicate excessive mortality from diseases other than cancer.

So far, these statisticians applied only two kinds of tests to their data: for steadily increasing or decreasing linear trend of risk with received radiation dose (or distance from the hypocenter); and for heterogeneity of this risk, or the net effect of any deviations from constant risk with dose. Finally, although one can find several instances of significant heterogeneity *without* evidence of linear trend in published reports, these findings have been ignored either by International Commission as well as by present sponsors of the mortality study,

the Radiation Effects Research Foundation.

Why do we attach importance to the neglected observations? Because the mortality study started:

- after so many had died from acute effects of immune system damage that only a small fraction of the original cases were at risk of later effects; and
- after the combined effects of winter conditions, destruction of homes and dislocation of essential services had caused so many infection deaths that all but the outer fringes of the Hiroshima and Nagasaki populations had probably lost most of their infection-sensitive members.

A "healthy survivor" effect related to danger-level distances is a late consequence of all large-scale catastrophes and, after an earthquake or a conventional air raid, it will sooner or later reverse any initial trends of mortality. Suppose, however, that this effect is in

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competition with late effects of marrow damage. If the personal damage is less widespread than the property destruction, then anyone who plots infection deaths against danger-level distances will find that the slope of the curve is in opposite directions at upper and lower ends of the danger-level scale.

In short, given the analysis which has thus far been applied to atomic bomb survivors, there will certainly be evidence of heterogeneity of the dose risk. And provided the healthy survivor and the marrow damage effects are roughly equal, there need be no statistically significant linear trend of response, either with radiation dose or hypocenter distance.

In recent Radiation Effects Research Foundation reports, significant heterogeneity has usually gone hand in hand with an increasing linear trend with dose. This combination is typical of deaths from blood diseases as well as leukemia and other neoplasms. But there are examples of significant heterogeneity with no evidence of linear trend, and this is most typical of two groups of non-cancer deaths: tuberculosis and a residual group containing deaths from pneumonia, bronchitis, pyelitis and other respiratory and renal infections. In contrast, two groups of deaths which, from their sudden nature, should be minimally affected by immune system degradation—cerebrovascular accidents and suicide—either show no significant heterogeneity or a strong downward trend with dose.

Therefore, before concluding that none of the deaths after October 1950 is the result of cell-killing effects of the atomic bomb radiations, we should be quite certain that these deaths are not being caused either by selection effects of earlier deaths, or by immune system degradation. The first would probably be of shorter duration than the second. If both are affecting the Foundation's data there could be a period when the dose response curve for infection deaths is U-shaped, indicating significant heterogeneity without evidence of linear trend, followed by a period when the downward slope is less obvious than the



Sidney Harris, United States

upward slope, producing a J-shaped curve.

Only epidemiologists with direct access to the Research Foundation data can tell us whether late effects of the radiation exposures included infections and blood diseases as well as cancers. However, from the Supplementary Tables of the Ninth Mortality Report one receives two distinct impressions: first, that the dose response curves for cardiovascular and other non-malignant diseases are very different; and second, that the curve for other non-malignant diseases, which remained U-shaped until 1962, is now J-shaped.

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Nerve gas

John Isaacs' article, "Nervous about Nerve Gas" (*Bulletin*, December 1983), notes that "production of a new generation of nerve gas weapons has produced one of the more unusual paradoxes in Washington, D.C." He concludes that a strong and presumably moral aversion to chemical weapons, paradoxically, does not seem to extend to the much larger and more ominous nuclear weapons programs.

To the student of evolutionary biology there is no paradox here. Instead one finds an extraordinarily useful paradigm and a vast body of research which explains aversion to one category of threats

to survival (in the sense of reproductive success potential) and affinity toward another.

The existence of genetically transferable, chemically based memory which can significantly affect attitude and behavior has been demonstrated in the modern literature of evolutionary biology. It seems highly probable, if not yet testable, that aversion to chemicals, and biological agents as well, which create familiar symptoms has been selected for over long periods of time. The human species has had much experience with biological and chemical agents found in nature, and we tend to stay away from them because they "smell bad" or "taste funny" or they "look disgusting."

Radiation is a truly "senseless" phenomenon and the other traits of nuclear weapons are totally new to human experience. Nuclear weapons constitute a *surprise* to the human gene pool. These other weapons are quite familiar in an evolutionary sense and we "know" with some precision how we should feel toward them; our history as a species has, in its thoughtless way, "educated" us.

Our problem, then, is to educate ourselves in nuclear matters. The nature of this challenge is captured in the dialogue between a science advisor and the director of *The Day After*. When the advisor was asked what a camera would "see" at ground zero, he said: "It wouldn't see anything; it would be vaporized."

Thomas J. Payette

Ann Arbor, Michigan 48104

That's not defense

John Isaacs' fine article in the February *Bulletin* had an unfortunate title: "The Defense Budget in an Election Year." I challenge the use of the word "defense" when more than 70 percent of that budget is not directly connected to the defense of the United States itself.

The proper characterization is "military budget." This is not an idle quibble over words. The voters and even the legislators are less likely to criticize a

budget for "defense," a word with positive connotations. Who would be against the defense of the homeland?

It is difficult to justify as defensive such weapons as the MX missile, the B1-B bomber, the Trident II submarine-launched missile, poisonous nerve gas and Pershing II missiles, to say nothing of a 600-ship Navy doing nothing at patrol every sea.

When the word "defense" is used, the battle has been half lost with the general public. Let us call things by their correct names, in this case the "military budget."

Jerome Grossman, President
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Boston, Massachusetts 02108

Contradiction in terms

A group of Harvard professors recently authored a most pessimistic book, *Living with Nuclear Weapons*, which takes the position that reducing the world's nuclear stockpiles would jeopardize deterrence and actually make for a less stable world; that there can never again be a world without nuclear weapons.

Jonathan Schell, in a two-part *New Yorker* series (Jan. 2 and 9, 1984), "The Abolition," addresses this pessimism with a unique and, I believe, most effective argument. He starts with the dilemma posed by Einstein and his fellow scientists: that we must either exist in a world armed to the teeth, and face ultimate destruction; or we heretofore arrogant, cantankerous humans must learn to submit to some form of world law, which is impossible.

The Harvard group, and of course others, as Schell reminds us, have pointed to the fact that nuclear weapons have put an end to "war"—in the sense that war can no longer be an effective extension of political policy. No one can conquer another nation with nuclear weapons. Both sides are certain of destruction and the world and even our species are in jeopardy as well. Thus, the Soviet Union and the United States can never again be at war.

The danger, of course, is that a war

may erupt, unwanted and unplanned. This danger is increased rather than lessened by every new electronic "improvement," each of which works to shorten the so-called "lead-time" (now only six or seven minutes), the time during which we must decide if the computer is really correct when it says the enemy is attacking. There have been literally hundreds of these computer errors and

yet here we are, almost if not already, at the point where we must allow these mindless computers themselves to launch a counterattack, the so-called "launch on warning."

Schell's analysis is that, yes, deterrence has worked, but the weapons themselves are too dangerous. It's true, he says, that we can never get rid of the knowledge of how to make the bomb,

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but conceivably we can (we must) get rid of the bombs themselves. We can still have deterrence in the form of the *knowledge* of how to make them. Deterrence can be based on knowing that any nation violating such an agreement would be assured of the rapid nuclear re-arming of not just the United States and the Soviet Union, but of many nations. The dangerously short lead-time can be increased from six or seven minutes to six or seven weeks.

By abolishing the weapons, but not the knowledge, we would lessen at once the danger of destroying our entire ecosystem by a nuclear winter, by massive radioactive fallout and by damage to the ozone layer.

Jonathan Schell presents us with directions that, while difficult, are hopeful and possible and worthy of the highest aspirations of humanity. He has the wisdom to see that "living with nuclear weapons" is a contradiction in terms and cannot be part of the solution.

Lowell Brown, M.D.
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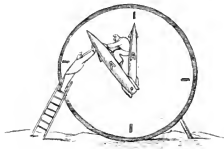
Chicken Little

We all remember the tragic story of Chicken Little, who believed the sky was going to fall, and tried to convince everyone in the hen coop that catastrophe was approaching. But the sky did not fall and the world went on. Chicken Little became a laughingstock in the community.

The moral of the story is obvious: she did not have good, scientific information on which to base her forecast. Of course, we are much more sophisticated than she and understand the wolf-crying syndrome.

But wait! Chicken Little is back, with all the credentials and knowledge to make forecasts based on the best scientific evidence. She has data and facts to support the probability that she is right this time.

She now writes for the scientific journals. She makes speeches to associations of experts and gatherings of academia. Her opinions are considered to be the best information available on the sub-



Paul Valéry, West Germany

ject. And she has almost no influence on anything at all.

That last sentence is the reason I am writing. I believe it to be true of this magazine and probably other publications that I am not familiar with. My intent is not to belittle the *Bulletin* or its authors. I am, in fact, generally in total agreement with what is published here. My position is that you are not getting your message to the people who should get it.

I'm a pretty average guy, I suppose. I have no science degree or special abilities that would put me in the world of your writers. Usually I am awed by their credentials. But—and here is the crux of the matter—I have more influence than they do. Why? Because there are millions of me and only thousands of them. I will elect the people who make the decisions. I will decide the course of the country. The people who make the decisions try to please *me*, because they know I can remove them if they don't keep me happy. That isn't the most efficient way to run a country but that's the way it is.

Therefore, if the experts would like to have influence they must convince me of their wisdom. They must get the message to me in a way that I will accept and understand. I believe the *Bulletin* is not getting to anyone except other experts. And it must.

The *Bulletin*, in its present form, is repetitious and boring. If you've read one issue why bother with the next? I suppose a scientist or other specialist would see nuances and subtleties not evident to most of us, and if the intent of the magazine is to distribute information among experts then the mission is accomplished. If, however, the intent is

to influence the direction in which we're going it fails.

I recently had a discussion with a friend who disagreed with me about this country's nuclear weapons position. I showed him a *Bulletin* article to support my argument, and the specific paragraph I indicated impressed him. But after he thumbed through the magazine a little more he said: "Those people sit in their ivory towers and have no idea what's going on in the real world." He was influenced by the paragraph I showed him, but became bored after a little further reading.

If all this influence I've got is to do any good I must get serious and make some suggestions. One is that the kind of articles you now publish stay the way they are; but in between them print something a little lighter maybe even something humorous. I am not suggesting you change the seriousness or urgency of your articles, but make an effort to attract and hold the attention of less expert readers. There must be authors who share your (and my) beliefs and sense of urgency, but who have the writing ability to interpret the heavy articles so that we will appreciate what the experts are telling us.

I truly hope you will become a focus for reason and sensibility in our country and the world. I am sure the potential is there.

Ralph Seiler
Bountiful, Utah 84010

Even if it hurts

I was distressed to read in the editorial of your February 1984 issue that the *Bulletin* was being urged to "tone it down." Please don't! The world is full of people and publications saying "everything is getting better all the time"; the *Bulletin* is a sorely needed counterweight of (perhaps unsettling) realistic thinking. The *Bulletin* is all the more valuable because it speaks the unpleasant truth—keep up the good work!

Jonathan Thornburg
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Hugh G. Mosley, University of Maryland
The author focuses on the question of whether the
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ISBN 0-669-05237-x June 1984



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